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BACTERIOLOGICAL AND CLINICAL OBSERVATIONS ON THE LOCAL TREATMENT OF INFECTIONS AND FRESH TRAUMA WITH A PENICILLIN CREAM*

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DURING the past year a study of the topical use of various bacteriostatic agents under the occlusive type of dressing infrequently changed was carried on in Montreal under the sponsorship of the National Research Council. The study embraced the use of different chemotherapeutic agents including penicillin in emulsion or cream bases. This paper deals only with the 36 cases treated by penicillin, which only became available from the Banting Institute in December, 1943. The work was carried out by a Subcommittee of the McGill Regional Surgical Committee of the National Research Council. The bacteriology was done in the Bacteriological Department of McGill University. All of the penicillin-treated cases were in the Montreal General Hospital. The necessary pharmaceutical work was done by the hospital pharmacist.

OBJECT OF STUDY

The object of the study was to determine the practical value of the various locally used bacteriostatics in relation to well-established surgical practice. So far as penicillin is concerned there were three main objects: (1) An evaluation of penicillin for topical use in wounds and infections. (2) A comparison with sulfonamides and other bacteriostatics for topical use. (3) To determine whether any chemotherapeutic agent is necessary at all.

To obtain adequate comparative results in the project as a whole, it was necessary to eliminate as many variables as possible and to run a series of controls. Briefly stated, this was accomplished in the following manner: (1) By a standardized handling of cases. (2) By the use of a standardized surgical technique. (3) Through employment of the infrequently changed occlusive compression dressing in all cases with or without a plaster encasement. (4) All bacteriology was done by a single technician. The cultures were obtained through a lucite window incorporated in the dressing. (5) All cases were under the supervision of a single surgeon and results judged by a small group. (6) The bacteriostatic agents were, with the exception of penicillin, used in a standard emulsion base. This base was also used for the controls. Penicillin was found on trial to be inactivated by this base in a few days, so a new cream vehicle had to be devised. Apart from this digression the variables have been the chemotherapeutic agents and the type of case. The calcium salt of penicillin as supplied by the Banting Institute has been employed for all topical treatment.

While this paper deals mainly with the penicillin-treated cases, certain comparative observations will be referred to briefly. This series of cases is small and we urge caution in evaluating the results. The work is still in progress. Being mindful that the present enthusiasm for chemotherapy may lead to catastrophic subordination of well-established surgical practice, it is worthwhile to emphasize again the surgical principles involved. These are: adequate aseptic technique for surgery and dressing change; adequate incision or excision of wounds; the value of relief of tension; the removal of foreign bodies; adequate curtain drainage of wounds and delayed primary closure; sutures without tension; appropriate massive compressive dressings; prevention of contamination by the occlusive compression dressings infrequently changed; the value of rest by immobilization.

* This work was carried out under the auspices of the National Research Council.

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TABLE I.

PRE-EXISTING INFECTIONS

Case	*Diagnosis*	*Operation*	*Subsequent treatment and redressing*	*Results*	*Bacteriology (pathogens)*
1.	Infected chronic leg ulcer with abscesses, leg	Incision: packing	Secondary suture and graft at 14 days	Healing complete in 6 weeks	B. hæmolytic streptococcus disappeared after 1st treatment
2.	Chronic osteitis tibia, with superficial sequestrum	Removal of sequestrum: saucerization, packing	Dressed weekly: at 3rd dressing, grafted and packed with S.T.E. gauze	Healing complete in 6 weeks	Staph. persistent
3.	Brodie abscess of 17 years in tibia	Saucerization, packing	Dressed fortnightly: at 2nd dressing, grafted and packed with S.T.E.	75% take of graft healed in 8 weeks	Staph. (not penicillin resistant) persistent. 1,000,000 units intramuscularly
4.	Chronic leg ulcer, non-vascular	None: Elastoplast C. dressing	Dressed weekly, patient mobile	Healed in 6 weeks	Staph. persistent
5.	Chronic osteomyelitis humerus with sequestrum	Removal of sequestrum: saucerization, packing	Dressed fortnightly	Not quite healed at 8 weeks	Staph. persistent
6.	Chronic leg ulcers both heels	None: Elastoplast C. dressing	Dressed weekly	Healed in 4 weeks	Right: staph. persisted. Left: no growth
7.	Chronic osteomyelitis tibia, sequestrum	Removal of sequestrum: saucerization, packing	Dressed at 3 weeks	Healing at 6 weeks	Staph. persistent
8.	Chronic leg ulcer, superficial ostitis of tibia	Removal of sequestrum: saucerization, packing	Dressed fortnightly: at 2nd dressing grafted and packed with S.T.E.	Healed in 6 weeks	Staph. absent one week then reappeared
9.	Chronic leg ulcer	Excision and packing	Dressed weekly	Not healed at 8 weeks	Staph. persisted
10.	Chronic subcutaneous and fascial infection	Excision and packing	Dressed weekly	Not healed at 6 weeks	Staph. absent. Heavy growth of pyocyaneus. Persistent
11.	Carbuncle on buttock	Incision and undercutting, packing	Dressed on 4th day	Under treatment	Staph. persistent
12.	Carbuncle on neck	Incision and undercutting, packing	Dressed on 4th day and weekly thereafter	Healed at 4 weeks	Staph. absent at four days then reappeared
13.	Chronic osteomyelitis tibia, sequestrum	Saucerization, packing	Dressed fortnightly	Healed at 4 weeks	Staph. persistent
14.	Chronic osteomyelitis tibia, sequestrum	Saucerization, packing	Dressed fortnightly	Not healed at 6 weeks	Staph. persistent
15.	Infected human bite: hand	Incision and packing	Redressing weekly	Not healed at 2 weeks	Spirochæte and fusiform bac. of Vincent. Persistent. Staph. persistent
16.	Granulating area on back	None	Weekly dressing	Grafted at 14 days, excellent healing	Staph. persistent. Strep. Beta A disappeared
17.	Suppurative tenosynovitis flexor tendon	Incision and packing	Weekly dressing	Still under treatment	Strep. Beta A disappeared

There must also be a realistic appreciation of the clinical significance of bacteria in wounds. Most wounds, especially if anatomically complex, will contain bacteria up to the time of healing. They may be bacteriologically filthy without clinical signs of infection. The mere presence of bacteria is not synonymous with infection, nor for that matter will control of *most* of the microbes by any bacteriostatic suffice to remove the danger of infection ensuing, and there is no reason to suppose that complete sterilization of wounds by chemotherapy is an immediate possibility. The prevention of development of a contaminated wound into an infected wound is determined by many factors, of which chemotherapy is only one.

Bearing all these facts in mind what criteria are to be satisfied by penicillin in the local treatment of wound?

Clinical criteria.—Rate of healing; restoration of function; clinical evidence of persistent infection, if any; practicability of treatment under all conditions, but especially under the occlusive compression dressing infrequently

TABLE II.

FRESH TRAUMA

Case	*Diagnosis*	*Operation*	*Subsequent treatment and redressing*	*Results*	*Bacteriology (pathogens)*
1.	Donor site	Skin graft	Redressed every 4th day till 16th	Healed in 20 days	Staph. persistent
2.	Donor site	Skin graft	Dressed at 4 days and at 14 days removed	Healed in 18 days	Staph. absent at four days then reappeared
3.	Severe crush, hand and fingers	Wound excised and packed	At 14 days sutured and grafted (first dressing)	Healed at 4 weeks, function at 6 weeks	Staph. absent at four days then reappeared
4.	Crush hand and compound fracture, metacarpals	Wound excised and packed	Dressed at 2 weeks and grafted at 4 weeks, healed	Healed at 4 weeks	No growth till 9th day then staph.
5.	Crush foot and compound fracture, tarsal bones	Wound excised and packed	Dressed at 2 weeks and secondary suture	Healed at 4 weeks, walking plaster boot	*B. Coli.* Heavy growth persisted
6.	Traumatic amputation, thumb	Wound excised and packed	Dressed and secondary suture at 2 weeks	Healed at 4 weeks, plastic operation later	Staph. absent on 4th day then reappeared
7.	Crush hand and fingers, amptuation	Wound excised and packed	Dressed and secondary suture at 2 weeks	Healed at 4 weeks, function slow	No growth
8.	Donor site	Skin graft	Dressed at 14 days and removed on 19th day	Healed at 19th day	No growth
9.	Compound fracture of humerus	Wound excised and packed, plaster C.D.	Still in original cast at 3 weeks	Still in dressing, no infection	Staph. persistent
10.	Crush hand and fingers	Wound excised and packed	Dressed and secondary suture on 14th day	Still in dressing, no infection	Staph. persistent
11.	Severe abrasions chest, 3 ribs fractured, elbow dislocated	Wound, ribs and elbow dressed with burn dressing, all one dressing	Still in original dressing at 10 days	Uncomplicated clinical recovery, no evident infection	Non-hæmolytic strep. persistent, coliforms persistent
12.	Traumatic amputation, hand	Excision and packing	Still in original dressing at 10 days	No clinical evidence of infection	
13.	Donor site	Skin graft	Dressed at 4th and 8th days	Healed at 10 days	Staph. persistent. Strep. Beta A disappeared
14.	Wringer, avulsion hand	Partial closure pack	Under dressing	Under treatment	Staph. persistent

changed; comfort of the patient; best method of its employment with proper surgical technique; stability of the preparation used; relative value of penicillin topically applied as compared with other bacteriostatics.

Now what is our existing information about penicillin in topical treatment, *i.e.*, its advantages and limitations?

Advantages.—Its known effectiveness *in vitro* and in systemic treatment particularly against the pyogenic cocci as compared with sulfonamides, etc.; its non-neutralization by necrotic products; its low rate of toxicity compared with sulfonamides, etc.; its relative freedom from manifestations of hypersensitivity.

Limitations.—Its rapid absorption from the vascular bed of a wound; its amazing rate of elimination from the circulation by the kidneys; the consequent difficulty of obtaining and maintaining prolonged high local concentration; the inhibitory action on the diffusion of penicillin by local collections of pus and fibrin; its destruction by coliform organisms; its uselessness against almost all Gram-negative bacteria; its relative instability and the need for refrigeration; the pain or discomfort from local applications.

PROCEDURE

Taking these known facts into consideration we set out to devise a cream base which would give a relatively stable preparation and which was hoped would deliver penicillin into a wound in a therapeutic concentration over a sufficient number of days consistent with the principle of infrequent dressings. In the effort to achieve this, we used ascending concentrations of penicillin from 50 units up to 5,000 units per gram of cream. The lower concentrations we felt might be satisfactory for prophylaxis in fresh trauma, while the higher concentrations might well be necessary in active existing infections. Again we considered that higher concentrations were advisable, as our plan called for the infrequent change of dressing, for it is our belief that this is an essential part of the treatment for all wounds and infections. Our experience with this project has only served to confirm this, since fresh trauma cases have universally done well before the days of penicillin. Cultures were made from all cases before and after surgery. The penicillin cream was packed into the wound in a gauze pack, using from 15,000 to 150,000 units in the individual case, that is, about an ounce of cream, commencing with 500

TABLE III.

BURNS AND SUNDRIES

Case	*Diagnosis*	*Operation*	*Subsequent treatment*	*Results*	*Bacteriology (pathogens)*
1.	Deep superficial burn, leg and foot	Mechanical cleansing and burn dressing	Dressed and grafted on 15th day	Healed on 28th day	Staph. persistent
2.	Deep superficial burn, thigh and leg	Mechanical cleansing and burn dressing	Dressing removed on 14th day	Healed on 14th day	No growth
3.	Brush burn of face	Mechanical cleansing and burn dressing	Dressing removed on 9th day	Healed on 9th day	Staph. absent at 4th day then reappeared
4.	Superficial burns face, neck, forearm	Mechanical cleansing and burn dressing	Dressing removed on forearm, 6th day; rest on 9th day	Left arm healed on on 6th day; rest on 9th day	Staph. persistent
5.	Superficial and deep burn, chest	Mechanical cleansing and burn dressing	Dressing removed and grafted on 17th day	Healed on 31st day	Staph. persistent
(Turp) 1.	Severe crush syndrome, compound fracture legs and pelvis	Wound excision and packing	100,000 units penicillin intravenous continuous drip for 10 days	Died on 17th day, uræmia	No staph. found. *B. Coli* and green strep. from perineum
2.	Post-pneumonic pneumococcal empyema	Aspiration and 17,000 units penicillin	Repeated with 27,000 units on 3rd day	Excellent recovery clinically	Sterile on 3rd day
3.	Staph. empyema	Aspiration and 30,000 units penicillin	Repeated on 3rd and and 5th days	Excellent recovery clinically	Sterile on 7th day

units calcium penicillin per gram. We successively increased this concentration to 750; 1,000; 3,000 and 5,000 units per gram. After surgical excision of the wound or evacuation of the abscess the material was packed into the wounds in exactly the same way as other agents were used in a gauze pack.

In every case a bulky occlusive compression dressing with cotton waste was applied and where necessary for immobilization, a plaster encasement added. The surgical lucite windows were incorporated in the dressings so that only a thin layer of gauze lay between them and the wound proper. This allowed for secretion to accumulate at the bottom of the window or in the gauze sufficiently to permit a culture to be taken at suitable periods. The practice of infrequent change of dressing, not less than weekly, was followed throughout. This practice has been found to be so successful in clinical results for the past three years that we have seen no reason to wish to change it.

As will be seen from the results we feel that the occlusive compression dressing infrequently changed is the main factor in the ultimate healing of wounds. *So strong are our convictions on this point that we feel that any attempt to assess results on frequent changes is bound to suffer the criticism that repeated contamination can and does occur.*

RESULTS

Penicillin was used in this manner in 36 cases. Of these, 17 were classed as pre-existing infections, 14 as fresh trauma and 5 as burns. In the three tables presented an attempt has been made to analyze the clinical and bacteriological findings under the headings of pre-existing infections; fresh trauma; burns and sundries.

In Table III certain cases of sundry nature are recorded for the sake of comparison and to allow for special comment.

ANALYSIS OF CHARTS

Pre-existing infections.—Seventeen pre-existing infections, mainly with *Staph. pyogenes,* are analyzed. These included: 4 chronic leg ulcers; 6 chronic osteomyelitis cases; 2 carbuncles; 1 large abscess of the leg; 1 infected human bite; 1 chronic Gram-negative infection of deep fascia; 1 large granulating wound; 1 acute suppurative tenosynovitis.

Results.—Bacteriological: Staphylococci persistent in nearly all cases. Lancefield A streptococci disappeared in all three cases. Coliforms and many other bacteria were not affected. Clinical: All staphylococcal cases except chronic osteomyelitis showed good healing in spite of persistent organisms.

Fresh trauma.—Fourteen cases of various types are analyzed. These included: 5 crush injuries of hand or foot; 2 compound fractures; 2 traumatic amputations; 4 donor sites; 1 severe abrasive injury.

None showed clinical evidence of infection despite the persistence of staphylococcus in most of these cases. It should be understood that the recurrence of these organisms even after 4 days or more implied that they were only controlled and not eliminated. Even the coliform-contaminated case did well.

The Lancefield A streptococcus disappeared. One non-hæmolytic streptococcus was persistent.

Clinical healing and functional restoration has been universally good.

EVALUATION OF THE RESULTS IN THE LIGHT OF BACTERIOLOGY

In spite of our small series it would seem highly significant that the pyogenic staphylococcus has consistently survived in these wounds to which penicillin has been applied even in the highest concentrations. This is sharply at variance with the findings of Florey and Williams, for example, but it must be emphasized in the first place that they were using daily applications of penicillin. In the second place their more obvious success was with very minor and superficial infections, *e.g.,* paronychias.

In reviewing the bacteriological results, it has been apparent that some *control* of the staphylococcus and streptococcus has been maintained fairly constantly during the "lag" phase of wound healing, when free bacterial multiplication is most dangerous. In this sense any antibacterial substance should have considerable value (and we have confirmed this fact with others, notably sulfathiazole). In the past, however, many antiseptics have had the disadvantage of being less toxic for bacteria than for the leucocytes, which are in the last analysis the things that dispose of bacteria. Penicillin by contrast in concentrations which are highly bactericidal is free from this limitation. For this reason we feel that the most fruitful line of investigation of its topical use lies in the endeavour to find a way of maintaining active concentrations in potentially infected zones of tissue

without the obligation of daily renewal. This requirement is the subject of much investigation in many places. We would like to reaffirm our belief that the use of penicillin or of any other bacteriostatic agent locally should not be made contingent upon the abandonment of the occlusive compression dressing infrequently changed. It is our firm belief that frequent dressing changes particularly by inexperienced hands, impair the vitality of tissues and interfere with repair processes, altogether apart from the serious risk of contamination.

CONCLUSIONS

1. The time of healing and functional restoration of cases under treatment with the occlusive compression dressing infrequently changed is considerably faster than with frequent changes, whether bacteriostatics be used or not. The controls showed almost as good results as the bacteriostatic cases. Penicillin-treated cases showed no better clinical results than other bacteriostatics, notably sulfathiazole.

2. Clinical evidence of infection in the series under these dressings is minimal. Of the control cases, 2 out of 12 showed some persistent fever. Of the penicillin-treated cases only the chronic bone infections and those infected with Gram-negative organisms showed clinically any persistent local infection and even these tended to heal better than when dressings were frequently changed. There was no evidence that the penicillin cases showed any better results than those treated with sulfathiazole, etc.

3. The practicability of a penicillin cream as a bacteriostatic agent under these dressings has been demonstrated, at least in so far as any bacteriostatic agent may be of value.

4. Under the occlusive compression dressings patients are remarkably comfortable. Bacteriostatics may influence this to some extent inasmuch as the sulfonamides are mildly anæsthetic. Calcium penicillin, on the contrary, at least in the form at present supplied has proved somewhat painful in more than half of the cases of fresh trauma and burns.

5. Penicillin for topical use may be usefully applied in a cream base, though it is possible that some other method of introducing it into the occlusive dressing, such as by injecting a solution through a cannula, may be found.

6. A penicillin cream has been devised which has been found to be active and stable under ice-box conditions for six months.

7. Relative to other bacteriostatics and notably sulfathiazole, penicillin shows no superiority and has the disadvantage that the calcium salt is often somewhat painful.

Finally, any method of using penicillin for topical application should be consistent with the principle of infrequently changed occlusive compression dressings.

REFERENCE

1. FLOREY, M. D. AND WILLIAMS, R. E. O.: Hand infections treated with penicillin, *The Lancet*, 1944, 1: 3.

THE ACTIVE MANAGEMENT (NON-OPERATIVE) OF CRANIO-CEREBRAL INJURIES*

(The Disposition of 180 Canadians and a Follow-up of 132 Patients Returned to Active Service in the Canadian Army [Overseas])

By Lt.-Col. E. H. Botterell and Captain K. E. Wilson
R.C.A.M.C.

THIS presentation is a study of 246 patients consecutively admitted, within 3 days of receiving a cranio-cerebral injury uncomplicated by depressed fracture, intra-cranial hæmatoma or post-traumatic meningitis. It is our purpose to discuss factors influencing the type of patient received at this hospital, the use of the duration of post-traumatic amnesia as a basis for classification of patients, the active management of the acute phases following a head injury, and rehabilitation.

The rehabilitation of Canadian soldiers and the effects of cranio-cerebral injuries of varying degrees of severity are assessed in relation to a soldier's future fitness for service. Of the 246 patients in this series, 180 were Canadians. The final disposition of all Canadian soldiers has been analyzed and a follow-up study is reported of the 132 patients returned to duty. The remaining 66 patients, of the total series of 246, were for the most part serving in the British armed forces or civilians engaged in some form of national service. There were a

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few members of the armed forces of the other United Nations stationed in Britain.

The exclusion of patients admitted more than three days following injury was arbitrarily decided upon because most patients admitted within 3 days presented active problems. The presence or absence of a scalp wound has been ignored. There were 99 cases in which a scalp laceration was sutured for the first time, or opened and re-sutured within two days of injury. In only one instance did infection occur. We have similarly attached no importance to compound linear fractures of the skull for, with uniform primary healing of the scalp wound, such cases have given rise to no complications due to deep sepsis.

It must be emphasized that the great majority of these patients were young men in excellent physical condition prior to injury; 62% of the Canadian group were between 20 and 30 years of age and there were but 9 over 40. Such a group of service patients differs greatly from a group of comparable size admitted to a civilian general hospital where many patients would be aged and infirm, their infirmity not uncommonly contributing to the accident.

The importance of the efficient management and disposal of the soldier with an uncomplicated head injury is emphasized by the low incidence of complicated cases. Among 515 consecutive cases of accidental head injuries admitted to the neurosurgical service there were but 9 cases of extra-dural hæmatoma, 35 cases of sub-dural or intra-cerebral hæmatoma, 62 cases of depressed fracture and 6 cases of post-traumatic meningitis. While this series of patients was admitted during a period of Army training, the problems of treatment and rehabilitation are equally important during active warfare involving as it does the use of thousands of motor vehicles.

To evaluate critically the information which follows, it is necessary to appreciate certain factors involved in the evacuation of patients to the neurosurgical service of this hospital.

Factors Influencing Admission of Patients

The fact that 55% of the 180 Canadians were injured in motor-cycle accidents and 20% in motor vehicle accidents, and only 25% in miscellaneous mishaps such as falls, fights, etc., indicates a potentially wide geographical scattering of the scene of injury. Such has been the case. Rarely is a patient admitted direct from the accident, while the average patient has been transported a minimum of 20 miles. The evacuation of patients is in accordance with the principle that patients with head injuries stand transportation well unless moribund, rapidly becoming more unconscious, or suffering from other serious injuries. While many very seriously ill patients have been admitted, it is a fact that desperately injured patients of the type that die within a few hours are rarely received at this hospital. Many service patients with head injuries of minor severity are not sent to this hospital but most cases complicated by depressed fracture, intracranial hæmatoma or post-traumatic meningitis are evacuated here at an early stage of their illness.

Post-traumatic Amnesia as a Measure of the Severity of Cerebral Injury

While all methods of grading the severity of head injuries have shortcomings, it has been found most useful to group cases in relation to the duration of post-traumatic amnesia (P.T.A.) as suggested by Russell,[1] and Symonds and Russell.[2] These authors take post-traumatic amnesia to end "at the time from which the patient can give a clear and consecutive account of what was happening round him". It is the return of continuous memory. The duration of post-traumatic amnesia represents the duration of the loss of "full consciousness".

Symonds and Russell[2] divided their cases into five groups:

1. P.T.A..... Nil.
2. P.T.A..... Under hour.
3. P.T.A..... 1 to 24 hours.
4. P.T.A..... 1 to 7 days.
5. P.T.A..... Over 7 days.

The cases in our series have been divided into but four groups:

1. P.T.A..... Nil to momentary.
2. P.T.A..... Minutes to 24 hours.
3. P.T.A..... 1 to 7 days.
4. P.T.A..... Over 7 days.

Patients with momentary amnesia are included in Group 1 for, on arrival at hospital they often appeared to be suffering no ill effects and in many instances could not understand why they had been sent to hospital. None of these patients had amnesia for more than the moment of injury. In civilian life it is unlikely that

they would have been hospitalized unless detained overnight for observation.

In our Group 2, P.T.A. ranges from minutes to 24 hours. Originally, following Symonds and Ritchie Russell[2] this group was divided into two sub-groups, the first consisting of cases with P.T.A. from a few minutes to one hour and the second with P.T.A. from 1 hour to 24 hours. Contrary to our expectations, comparison of the two sub-groups revealed no significant difference in the duration of hospitalization and only one patient (P.T.A. 8 hours) failed to return to duty. Therefore, all patients with P.T.A. ranging from a few minutes to 24 hours were included in Group 2.

Of the 84 cases in Group 2, considered later in the study of follow-up, 34 had a P.T.A. of one hour or less. The P.T.A. of the remaining 50 cases was from 1 to 24 hours. Table I indicates the number of cases in each group showing the Canadians separately for their final disposition is known and they were later followed-up.

TABLE I.

POST-TRAUMATIC AMNESIA

	Nil to momentary	*Few minutes to 24 hours*	*1 to 7 days*	*Over 7 days*
Canadian soldiers..	54	84	23	19
Others.....	23	34	2	7
Total cases.....	77	118	25	26

Included also in our Group 4—P.T.A. over 7 days—are those critically ill patients, with profound disturbance of brain stem function, presenting a relatively constant clinical picture and among whom there is a high mortality. Some of these patients died within 7 days but all who survived had very long periods of post-traumatic amnesia. It is noteworthy that 65% of all Canadians with P.T.A. over 24 hours were injured whilst riding motor-cycles.

Our decision to use P.T.A. as the means of indicating the severity of cerebral injury was arrived at only after trying other criteria, separately and together, such as the duration of unconsciousness, the amount of blood in the cerebrospinal fluid and the presence or absence of a fracture of the skull. Using P.T.A. blindly and without regard to other factors has certain drawbacks. Symonds and Russell[2] point out two errors commonly made in the estimation of P.T.A. The first is the interpretation of an "island" of memory as the end of P.T.A. The second error is to assess the duration of P.T.A. on the fact alone that the patient is aware of the activities around him for he later may have no memory of them.

Fatigue existing at the time of injury, a not uncommon state in soldiers undergoing strenuous training, alcoholism and morphine administered at forward medical units, are factors making it difficult to evaluate accurately true post-traumatic amnesia. Our practice has tended to underestimate the full duration of post-traumatic amnesia. In some instances it is probable that an island of memory has wrongly been considered the end of the amnesic period. In addition, it will be shown later that the duration of disability in relation to P.T.A. varies considerably for patients in Group 3 (P.T.A. 1 to 7 days) and Group 4 (P.T.A. over 7 days).

In spite of these deficiencies the duration of P.T.A. seems to us the best single yardstick by which to gauge the measure of the severity of disturbance of cerebral function following the type of head injury under consideration.

Before evaluating the results of treatment in relation to fitness for military duty, an account will be given of the principles governing active management and rehabilitation.

CONCUSSION

Coma immediately following cranio-cerebral injury is well recognized to result from concussion "a generalized reversible molecular reaction induced by physical stress" (Denny-Brown and Russell[3]). Upon the intensity of the concussion, particularly as it affects the closely linked mechanism of brain-stem and hypothalamus (Jefferson[4]) depends the degree and duration of disturbance of consciousness, and the period of post-traumatic amnesia. The fact that concussion results from molecular disturbance of the brain occurring without demonstrable microscopical changes is supported by the following description of a fatal head injury.

R., O.J. F.89618. A Canadian soldier was admitted 4 hours following a severe blow on the head. He was comatose and had been since the time of injury. The left pupil was dilated and fixed. On admission respirations were stertorous. Decerebrate rigidity was present with absent abdominal reflexes and extensor plantar responses. He died 6 hours following injury with terminal pulmonary œdema. Major S. P. Wyatt performed an autopsy and there follow excerpts from his report.

"A considerable extravasation of blood into the right temporal muscle. There was no fracturing of the skull and neither subdural nor extradural blood. The brain weighed 1,360 gm. and its coverings were normal. Coronal sections revealed no abnormality. No fine petechial hæmorrhages were present and there was no, so-called, generalized traumatic œdema. The mid-brain, pons and medulla were free of any gross pathology. No abnormality was found in the spinal cord or its coverings. Multiple blocks of the brain (cerebral cortex, basal ganglia, hypothalamus, mid-brain, pons, medulla and cord) were embedded in celloidin and sectioned and stained with Nissl's, iron hæmatoxylin — van Gieson's, hæmatoxylin and eosin and Gros-Bielschowsky. Microscopic examination was negative."

Denny-Brown and Ritchie Russell[3] quote Littre[5] as the first to describe negative autopsy findings in a case of fatal head injury and Jefferson[4] records 4 such cases in a series of 100 fatal head injuries. However, contusion of the frontal and temporal poles and orbital surfaces of frontal lobes is commonly found at post-mortem both in the brains of patients dying as the direct result of head injury or as a consequence of other injuries complicated by trauma to the head. In our opinion, such superficial contusion plays little or no part in the production of coma and semi-coma, save in those rare instances when massive hæmorrhage or cerebral softening forms a space-occupying lesion of significant size.

Whatever the mechanism of production may be, a full appreciation of the effects of concussion is a necessary foundation for the treatment of head injuries.

MANAGEMENT OF PATIENTS

Initial assessment.—Immediately after admission, the patient is carefully examined to establish a base line from which his future course may be followed. Of primary importance is the level of consciousness. A record of the patient's response to painful stimuli must be made if he does not respond to questioning. The consistent use of M.R.C. War Memorandum No. 4 *A glossary of psychological terms commonly used in cases of head injury*[6] would allow accurate interpretation of such terms as semi-coma. However, it is necessary to plead that all those dealing with confused or comatose patients record at frequent intervals sufficient data concerning the patient's responses when roused or painfully stimulated, so that succeeding observers may decide whether the patient is regaining consciousness or deteriorating.

The head is examined for evidence of injury, particular emphasis being placed on local areas of tenderness to firm palpation and swelling deep in the temporal region. Both these findings suggest an underlying fracture.

Bleeding or cerebrospinal fluid leak from nose or ears, blood in the middle ear, bleeding into the pharynx and hæmorrhage into the orbit must be noted. As complete a neurological examination is carried out as the patient's co-operation will permit. Examination of the fundi is important for, while a rapidly fatal increase in intra-cranial pressure may occur without papillœdema, we have on several occasions been greatly aided by its recognition within a few hours of injury. Inequality of the pupils, disturbed pupillary reactions and the time such findings develop are of particular importance. In unco-operative patients, facial paralysis can often only be demonstrated by lack of movement accompanying pressure on the supra-orbital nerve. Power in the extremities must be tested but often can only be gauged by the response to painful stimulation. The character of superficial and deep reflexes must be recorded (abdominal reflexes, plantar responses, knee and ankle jerks, etc.). Watch must be kept for evidence suggesting fracture —dislocations of the spine, particularly involving the cervical region.

X-ray.—Radiological examination of the skull is carried out immediately following the initial clinical examination in all patients except those who are obviously fatally injured or completely unco-operative. A very high percentage of satisfactory films is obtained by experienced radiographers, even when dealing with restless, confused patients. The administration of paraldehyde, avertin or pentothal may be necessary in certain cases where adequate x-rays are essential. Stereoscopic lateral, postero-anterior and half-axial views are taken, and when fractures involving the frontal or ethmoid sinuses are suspected, antral views are indicated. Similarly, special films of the mastoid region are requested if it is desired to show a fracture involving the mastoid. The importance of the early clinical or radiological recognition of a fracture involving air sinuses or mastoid, aids in the prevention of post-traumatic meningitis. A calcified pineal gland may be shifted, indicating the presence of cerebral œdema, predominantly unilateral, or confirming the presence of a suspected intra-cranial clot. Pneumocranium may have developed. A fracture line may cross

the groove of the middle meningeal artery, suggesting the possibility of an extra-dural hæmatoma. Finally, penetration of the skull may be demonstrated when it is not suspected clinically.

In Group 1 (P.T.A. nil to momentary) 11 of 77 patients had fractures of the skull demonstrable by x-ray. In 5 cases the fracture involved air sinuses or mastoid. In Groups 2, 3, and 4, linear fracturing of the skull was demonstrated in 105 of 169 patients. Involvement of accessory air sinuses or mastoid was shown in 27 patients. Fourteen of 105 fractures crossed middle meningeal vascular channels. In 3 of the 169 patients comprising Groups 2, 3 and 4, Major Eaglesham reported the pineal gland was measureably displaced.

Lumbar puncture findings. — Lumbar puncture has been almost regularly performed in this series of patients on admission. In addition, it was repeated if there was any deviation from the usual progressive lightening of post-traumatic stupor, if meningitis was suspected or if it seemed desirable because of troublesome headache. Consideration of the findings is indicated at this time for they bear on the principles followed in the management of these patients. Measurement of the intra-cranial pressure by means of an attached manometer together with cytological and chemical studies of the cerebrospinal fluid provide a useful but rarely an essential aid in initial assessment. If a patient is sufficiently restless to require forceful restraint lumbar puncture is contraindicated without sedation or anæsthesia. *When an intracranial clot is suspected lumbar puncture is contraindicated for cerebral herniation through the tentorium or foramen magnum may be precipitated making a fatal outcome inevitable.*

Correlation of the findings on lumbar puncture with the clinical picture has proved valuable in training surgical officers in the management of cranio-cerebral injuries.

Pressure.—Of the 77 patients in Group 1 (P.T.A. nil to momentary) 70 were punctured on admission. If 200 mm. cerebrospinal fluid be taken as the upper limit of normal, none of the patients in this group had an elevated pressure. Nor did any of them have a sub-normal pressure, below 100.

In Groups 2, 3 and 4 (P.T.A. minutes to days) there were 125 patients with adequate records of lumbar puncture done within 48 hours of injury. In the majority of patients the pressure was normal, that is, between 100 and 200. This is in contrast to the observations of Ritchie Russell[1] who found pressures of over 200 in 30 out of 49 punctures done on patients with severe injury. There were 25 patients with a pressure over 200 but only 4 patients with a pressure of over 300. All these punctures were done with care to eliminate as far as possible the factor of restlessness in a confused patient and its effect on the cerebrospinal fluid pressure. In some of those patients with elevated pressure it is probable that restlessness of the patient was responsible for the elevation of pressure. In one case the pressure on initial puncture was 250 and thereafter on 5 successive punctures was over 300. On the 19th day after injury, the pressure was still 300 though the patient had made an uneventful recovery and was entirely free of symptoms. There was no papillœdema. An oxygen encephalogram showed no evidence of a space-occupying lesion, and he returned to full duty with his unit. No explanation for the elevated pressure was found in this case.

Our experience indicates that but rarely does increased intra-cranial pressure resulting from cerebral œdema play a part in producing post-traumatic coma or confusion.

There were 8 patients in whom the cerebrospinal fluid pressure was subnormal, that is, below 100 mm. One patient was dehydrated and the pressure rapidly returned to normal following the administration of adequate amounts of fluid. Typical low pressure headache was present for several days in the remaining seven patients. So long as the patient remained horizontal or with the head low, headache was not a feature. Should the sitting or semi-erect position be assumed, headache immediately results and it is commonly accompanied by dizziness and sweating and less commonly by nausea and vomiting. Rest with elevation of the foot of the bed and a generous fluid intake was followed regularly by complete recovery within a few days.

Red blood cells.—Blood was commonly found in the cerebrospinal fluid of the patients comprising Groups 2, 3 and 4, but the amount of blood was related *only in a general way,* to the severity of the injury. No patients with a large amount of blood in the cerebrospinal fluid within 48 hours of injury were fully conscious

and yet several patients with severe generalized disturbance of cerebral function had relatively small amount of blood present and one fatal case had none. The largest amount of blood found in this series of cases was 3,510,000 red blood cells per c.mm. This occurred in a patient with P.T.A. of 1 to 7 days who eventually returned to full duty in category "A". Another officer who had a much more severe injury, with mental confusion for several weeks, eventually being invalided home, had only 3,600 red blood cells per c.mm. cerebrospinal fluid when punctured within 24 hours of the injury.

The presence of blood in the cerebrospinal fluid of a few of the cases in Group 1 (nil to momentary P.T.A.) was at first a matter of considerable interest. There were two patients in whom were found approximately 2,000 red blood cells per c.mm. of cerebrospinal fluid. In one case it would seem that force had been applied to the head in such a manner that it provoked a minimum of generalized disturbance of cerebral function, yet producing a linear fracture in the thin bone of the temporal region and damaging a superficial cerebral vessel possibly adhering to the arachnoid, or causing a minimal local cerebral contusion. It seems likely that a glancing blow, applying force tangentially to the skull, produces a predominantly local lesion rather than the generalized cerebral disturbance resulting in concussion. Similarly, rotational (contre-coup) contusion (Holbourn[7]) may or may not be present and cortical vessels may or may not give way. Clearly the quantities of blood in the cerebrospinal fluid must bear an inconstant relationship to the generalized disturbance of cerebral function—concussion—resulting from injury.

MANAGEMENT DURING POST-TRAUMATIC COMA, SEMI-COMA AND DELIRIUM

Of primary importance is the establishment and maintenance of unobstructed respiration in comatose and semi-comatose patients. During transportation and in hospital, such patients should be placed in the semi-prone position with the head slightly elevated and with the chin directed toward the stretcher or mattress. The tongue falls forward, away from the larynx, and the inhalation of blood secondary to a fracture of the base, is minimized. Laboured breathing leads to marked congestion of cerebral vessels, thus increasing cerebral œdema and promoting bleeding from any laceration of brain. The pool of blood and saliva which accumulates on the sheet adjacent to the mouth is good evidence of the efficacy and importance of the semi-prone position. If respirations remain laboured in the absence of any obvious obstruction, such as the tongue, and there has been bleeding from the pharynx, we are convinced that bronchoscopic aspiration should be performed or that the larynx and trachea should be sucked out. In several instances remarkable improvement in breathing has occurred when these procedures have been skilfully carried out by our anæsthetist, Major Everett Ainslie.

The further successful management of patients following a severe cranio-cerebral injury is dependent upon attaining two main objectives.

The first objective is the maintenance of the patient in as nearly normal a metabolic state as possible. This is no small problem, for semi-comatose patients commonly are unable to swallow and are expending large amounts of energy restlessly writhing about the bed.

Dehydration rapidly develops and is shortly complicated by the effects of starvation and both may be aggravated by the endless activity of a restless patient. Clearly, within 12 to 24 hours of injury, fluids must be provided and if nutrition and normal metabolic processes are to be maintained an adequate caloric intake must be supplied. Daily, by means of a gastric or duodenal tube, 2,000 to 2,500 c.c. of fluid containing 2,000 to 2,500 calories is administered in four feedings. The caloric value is derived from protein 100 gm., fat 100 gm., and carbohydrate 250 gm. Only on one or two occasions in this series has it been necessary to restrict the intake of fluids and promote excretion by administration of concentrated serum intravenously and a saturated solution of magnesium sulphate per rectum. Dehydration is never undertaken without excluding an extra-dural or sub-dural clot. A diagnosis of generalized cerebral œdema is not justified without bilateral negative burr-holes.

The comatose patient is regularly turned to prevent pressure-sores and pneumonia. The restless patient may require bandaging of

knees, elbows and ankles to prevent excoriation of the skin. Restlessness is periodically controlled by means of paraldehyde drachms 4 to 8 given per rectum or with tube feedings. Sodium luminal grains 3 administered intravenously or intramuscularly is also efficacious. Restraint is not used. The hands may be wrapped in cotton wool, bandaged lightly and then covered with stockingette taped to the wrists. This prevents the patient from removing dressings and excessively chafing his chest and abdomen. Placing the patient in a large tub-bath twice a day often does much to allay restlessness. Benefit often accrues from assisting a patient who is clambering about the bed to walk up and down the ward or corridor till he is physically fatigued. Repeated examinations are made to ensure that a distended bladder is not the cause of restlessness.

No concern is felt regarding the absence of a bowel movement for three to four days following injury. At that time or later, magnesium sulphate is given by mouth or tube or an enema may be administered.

The second objective during the acute and sub-acute phase is the early recognition and prevention and treatment of complications. No attempt will be made here to discuss the diagnosis and surgical treatment of intra-cranial hæmatoma.

However, it must be considered axiomatic that deepening coma commencing hours, days or weeks following a head injury must be presumed due to an intra-cranial space-occupying lesion or to deep infection until proved to the contrary.

Emphasis must be placed upon the need of efforts to prevent post-traumatic meningitis. To this end, sulfapyridine or sulfadiazine is administered, by tube if necessary, to all patients with bleeding from the ear or into the middle ear, with rhinorrhœa or otorrhœa, with bleeding from the nose in the absence of local injury, and to all patients with roentgenological evidence of a fracture involving accessory air sinuses or mastoid. The dosage is controlled by estimation of the level of sulfonamide in the blood in order to maintain 6 to 7 mgm. % of free sulfapyridine and 9 to 10 mgm. % of sulfadiazine for 5 to 7 days following injury. Sulfapyridine is given at four hourly intervals, usually one gram, after an initial dose of 2 to 3 grams. Somewhat larger doses of sulfadiazine are necessary.

ACTIVE MANAGEMENT FOLLOWING THE SUBSIDENCE OF POST-TRAUMATIC DELIRIUM

From the earliest stage at which even fragments of conversation may be understood, every effort must be made by doctors, nurses and orderlies to reassure the patient of ultimate recovery. The converse is of equal importance and unguarded remarks indicating a bad fracture or laceration of the brain must never be made in the hearing of a patient. For reassurance to be of the fullest possible value, all those in attendance must appreciate what remarkable recovery commonly follows in healthy young adults, even after days of delirium with incontinence and tube feeding.

No attempt is made to induce the patient to occupy the supine position in bed. He is encouraged to assume any position he wishes and the head of the bed is regularly propped up. When dizziness results from sitting up, an uncommon finding in young adults, the head of the bed is elevated by degrees and kept elevated by night as well as day. As soon as there are no *spontaneous* complaints of symptoms such as headaches and sufficient co-operation can be achieved, physical exercises are started while patients are still in bed. Four times a day for ten minutes, tension exercises with deep breathing are done under supervision. Sergeant G. F. Irven, R.C.A.M.C., has achieved great success in promoting enthusiasm among groups of patients for an active program of rehabilitation. The value of such a regimen is well shown by the following account of a patient.

Lieut. L., aged 25. Cranio-cerebral injury, cerebral contusion, VI and VII cranial nerve paresis, right hemi-paresis. Retrograde amnesia minutes; post-traumatic amnesia 25 days: no fracture of skull. Recovery was complete: returned to full duty.

This officer was treated elsewhere for some eight weeks following injury. He lay flat in bed and did not engage in any form of physical activity during 27 days after termination of post-traumatic amnesia. On admission here, he was started on tension exercises in bed, for he was free of symptoms other than diplopia. The exercises produced headaches, sweating, light-headedness and palpitation. Consequently, the duration and intensity of the exercises were reduced and then gradually increased without producing symptoms. Seven days after admission he sat up in bed using a back-rest and light-headedness and giddiness again resulted. He was then placed in a Gatch bed, the head of the bed being gradually elevated and maintained so day and night. Tension exercises were carried on vigorously four times a day and fourteen days after admission and ten weeks after the injury, he got up and remained free from symptoms. His further rehabilitation proceeded uneventfully save for an attack of bronchitis requiring hospitalization. Six months following injury he was categorized as fit for full military duties by a medical board.

In this case, both active exercise in bed and the gradual achievement and maintenance of the sitting position were important aids to recovery.

Efficient performance of tension exercises without the development of symptoms should be achieved in most cases before a patient gets out of bed. A few days is allowed for the average patient to be up and about the ward without duties other than the carrying on of tension exercises. Physical training is then started in the Department of Physiotherapy. Relatively light at first, the physical effort involved is increased till promotion to the second class is achieved. From the second class the patient moves on to full hospital physical training and at this stage three afternoon passes a week may be obtained, which commonly involve a two-mile walk to the nearest town. Ward kitchen fatigues, polishing the floors and the like, form part of the daily routine. Moving pictures and concerts are available in the evening and enjoyment of a moving picture following a head injury is, in our opinion, evidence of good progress toward recovery. Occupational therapy of handicraft type has proved useful by maintaining an interest in subjects other than cranio-cerebral injuries. Participation in floor checkers and table tennis is encouraged, for such games promote stooping and co-ordination of hand and eye.

The institution of active treatment commencing at an early stage following cranio-cerebral injury has developed with the increasing number of cases under treatment and success depends upon satisfactorily fulfilling certain requirements. The surgeon must assess each case to his own satisfaction and at an opportune time explain to the patient that recovery is the rule and what, if any, permanent disability, such as nerve deafness, he must accept. The surgeon also must be entirely convinced in his own mind concerning the patient's welfare and continue close supervision and reassurance throughout the various stages of recovery. To encourage a patient to undertake more than he is capable of achieving without undue difficulty is as harmful as prolonged inactivity. All those who play a part in the care of these cases must support the view that ultimate recovery is to be expected. Never is a patient asked directly if he has a headache, and indeed, apart from the period immediately following the P.T.A., headache has not been a commonly troublesome symptom among our patients. The principle must be stressed repeatedly that with increasing physical fitness an ever-widening range of activity can be undertaken without the development of undue fatigue or headaches of disabling intensity. Watch must be kept on the mental and emotional status of patients. A full history taken as soon as post-traumatic confusion has cleared is designed to provide the surgeon with an intimate acquaintance of the individual patient. Daily supervision of the individual's problem then provides the best method both of aiding and assessing recovery. The interest and behaviour shown during participation in the activities of ward and hospital, concern regarding mail from home, appreciation of the progress of the war and the degree of keenness concerning return to duty are but a few useful aids in judging recovery.

Great benefit has resulted from the close collaboration of the Neuropsychiatric Service in the treatment of head injuries. The early recognition of pre-existing or post-traumatic neurosis and other psychiatric states aggravated by or due to head injury has allowed the prompt treatment of these patients on the Neuropsychiatric Service. Minor degrees of mental impairment have been assessed. This collaboration has not only improved the treatment of the patients in question but has educated both physician and surgeon. Additionally, treatment on the neurosurgical wards is facilitated by the absence of unduly apprehensive and depressed patients. During recent months psychological testing has become available as part of the total assessment of these patients.

Throughout the period of rehabilitation, no arbitrary rules exist concerning the time any patient must carry on any stage of activity, be it tension exercises in bed, light or medium physical training. Progress and return to duty depend on freedom from symptoms at each level of activity or the acceptance of minor symptoms and achieving progress in spite of them.

Electro-encephalography. — Through the generous co-operation of Wing-Commander Denis Williams of the R.A.F. Medical Service, electro-encephalographic studies have been carried out on selected ambulatory patients.

Wing Commander Williams' reports have been of great assistance in many cases but it is not proposed to discuss the value of electro-encephalography in relation to the management

of head injuries. The reader is referred to the work of Williams, Jasper, Hill, etc.

Pneumo-encephalography. — Encephalograms were performed in 51 of the 246 patients. Where persisting confusion or headache existed, encephalography was used as a means of helping to exclude an intracranial space-occupying lesion and of assessing the degree of cerebral atrophy as shown by ventricular dilatation and increased cortical air markings.

Major D. C. Eaglesham, R.C.A.M.C., noted local deformity of the ventricles in six cases. Dilatation of one or both ventricles occurred in 13 cases. In two of these 13 cases, ventricular dilatation was progressive, terminating in marked hydrocephalus. Temporary ventricular shift was demonstrated in two cases.

Discussion of the clinical significance of ventricular dilatation is not possible in this presentation. It must be emphasized, however, that moderate enlargement of one or both ventricles should be regarded as but another physical sign forming part of the data to be collated in the assessment of a patient's disability. Ventricular dilatation alone cannot be considered as an invariable indicator of disability. Numerous patients with dilatation of one or both ventricles carry on full employment successfully. In general, the writers' experience agrees with that of Davies and Falconer[8] who noted ventricular dilatation with increasing frequency as the severity of the head injury increased.

DISPOSITION OF 180 CANADIANS AND FOLLOW-UP STUDY OF 132 PATIENTS RETURNED TO MILITARY DUTIES

The disability resulting from head injury and its effects upon the future fitness for service of soldiers have been studied in the group of 180 Canadians. It was only in this group that a uniform program of rehabilitation and follow-up was possible.

Patients were categorized as unfit for military service overseas as soon as it was decided that they would not return to some form of duty within six months of injury. They were then returned to Canada, the final results in terms of disability, pension and re-employment being as yet unknown. Patients with injuries other than to the head have been excluded from this series if transferred to general hospitals; if returned to duty from this hospital, they are included in the series.

A follow-up survey was carried on over a period of 3 to 21 months following return to duty. A form similar to that devised by the Brain Injuries Committee of the Medical Research Council was sent to the Regimental Medical Officer.

In 125 of the 132 patients followed, the form was returned with the necesary information. As a further check, the personal file of each man stationed in base units was examined for any entry indicating change in category. A similar check was made through the co-operation of 2nd Echelon regarding men returned to field units.

In addition to the 180 cases here reported, there are 5 to 10 additional patients, not more, who cannot be traced. These patients were admitted to the surgical service with head injuries and because of a psychiatric disability aggravated by or secondary to a relatively inconsequential head injury were transferred to the medical service. They were then discharged without reference to the head injury in the diagnosis.

Group 1 (see Tables II, A, B, C.)—There were 54 cases either without post-traumatic amnesia or of but momentary duration and of these, 5 patients were eventually unfit for service because of injuries to other parts of the body. One patient was transferred to another hospital for treatment of a general surgical condition. There were no deaths. There remain 48 patients whose disposal depended only on the extent of the disability caused by the head injury and all returned to duty, 47 in category "A" and 1 in category "B". There were no cases unfit for duty because of their head injury. Nine cases were sent to convalescent depot for further rehabilitation, and the average convalescent period was 11 days. The average time in hospital was 12 days and the average total time off duty 14 days.

Of the 48 patients returned to duty in this group, 2 are known to have been invalided since discharge from hospital. One of these patients was re-categorized on the basis of "psychoneurosis with obsessive compulsive manifestations, caused primarily by constitutional factors but possibly aggravated by his head injury". In the second case, the Board by which his category was lowered could not be traced. All the rest have remained at full duty, for the most part without any symptoms referable to the head.

Group 2 (see Tables II, A, B, C.)—In the group of cases with post-traumatic amnesia of minutes to 24 hours, there were 84 patients, and 5 of these were eventually unfit for duty because of other injuries. Ten were transferred to General Hospitals for further treatment of other injuries. There were no deaths. This leaves 69 patients whose disposal depended alone on the degree of recovery from the head injury. Sixty-eight of these returned to duty, 65 in category "A" and 3 in category "C". The patient who was invalided back to Canada was an illiterate man who developed what was considered to be a true post-traumatic state with persistent headache and dizziness. He had, in addition, a communicating porencephalic cyst which was considered to be traumatic in origin. Twenty-three patients in this group were sent to convalescent depot. The average convalescent period was 17 days. The average time in hospital was 30 days and the average total time off duty of the entire group was 36 days.

Of the patients who returned to duty, none have since been invalided though one has been lowered in category from "A" to "B".

Group 3 (see Tables II, A, B, C.)—In the group with post-traumatic amnesia from 1 to 7 days there were 23 cases. Three of these became unfit for duty because of other injuries. Four were transferred to general hospitals for treatment of other injuries. There were no deaths. This leaves 16 cases. Of these, 12 returned to duty, 10 in category "A", 1 in category "B" and 1 patient was placed in category "D" (temporarily unfit). He was invalided home but returned to full duty overseas in 6 months.

Four patients were unfit for further duty. All of these had persistent signs of brain damage: 1 had dysphasia, 1 hemiparesis, 1 internal hydrocephalus with mental deterioration, 1 residual headaches with mental deterioration.

Of the 12 patients who returned to duty, one is known to have been reboarded "E", but no record of the Board is available. There have been no changes of category in the remainder.

In this group, 8 patients were sent to convalescent depot for an average of 22 days. The average time in hospital was 39 days and the average total time off duty 54 days.

Group 4 (see Tables II, A, B, C.)—In the group with over 7 days' post-traumatic amnesia, there were 19 patients. None of these became unfit because of other injuries. One was transferred to another hospital for treatment of other injuries. There were 5 deaths. Four of the fatal cases were "critically ill" on admission with signs of brain-stem injury—coma, decerebrate rigidity, hyperthermia and disturbance of cardiac, vaso-motor and respiratory centres. The mortality rate in such cases is high—50% in this "critically ill" group — death commonly occurring within 48 hours of injury. The reasons for including these fatal cases in this group have been recorded earlier.

There were 13 patients whose disposal depended on the disability resulting from cranio-cerebral injury. Four returned to duty, all in category "A". Nine were invalided as unfit for duty. Of these, 4 had been "critically ill" and all showed mental deterioration while, in addition, 1 was dysphasic with internal hydrocephalus and 1 had residual cerebellar ataxia. Of the 5 other patients invalided, 1 had dysphasia, 2 had persisting mental confusion, 1 had increasing communicating hydrocephalus and 1 was re-categorized because of "rapid fatigue". All four patients who returned to duty went to a convalescent depot for periods averaging ten days and their average total time off duty was 59 days.

DISCUSSION

The "active" management of cranio-cerebral injuries has been evolved by degrees. From 1936 to 1939 one of us (E.H.B.) was respon-

TABLE IIA.

132 SOLDIERS FOLLOWED FROM 3 TO 21 MONTHS AFTER INJURY

	Group 1	*Group 2*	*Group 3*	*Group 4*
Post-traumatic amnesia	*Nil to momentary*	*Momentary to 24 hours*	*1 to 7 days*	*Over 7 days*
Total cases	54	84	23	19
Unfit for duty because of other injuries	5	5	3	0
Transfers (other injuries)	1	10	4	1
Deaths	0	0	0	5
Remainder	48	69	16	13
Number to duty.				
Total	48	68	12	4
Cat. "A"	47	65	10	4
Cat. "B"	1	0	1	0
Cat. "C"	0	3	0	0
Cat. "D"	0	0	1	0
Unfit for duty because of head injury	0	1	4	9
Invalided later	2	0	1	0

TABLE IIB.

THE AVERAGE TIME IN HOSPITAL OF 132 CANADIAN SOLDIERS RETURNED TO DUTY

	Post-traumatic amnesia			
Time in hospital	*Nil to momentary*	*Momentary to 24 hours*	*1 to 7 days*	*Over 7 days*
Under 2 weeks..	30	3	0	0
2 weeks to 1 month.....	14	38	None over	0
1 to 2 months...	4	24	three	4
2 to 3 months...	0	3	months	0
Average hospital days.....	12	30	39	49

TABLE IIC.

THE NUMBER OF PATIENTS SENT TO CONVALESCENT DEPOT, TIME AT CONVALESCENT DEPOT AND THE TIME OFF DUTY

	Group 1	*Group 2*	*Group 3*	*Group 4*
Post-traumatic amnesia	*Nil to momentary*	*Momentary to 24 hours*	*1 to 7 days*	*Over 7 days*
Total to duty...	48	68	12	4
Number to convalescent depot.	9	23	8	4
Average time at convalescent depot.....	11 days	17 days	22 days	10 days
Average total time off duty...	14 days	36 days	54 days	59 days

sible for the care of head injuries admitted to the Neurosurgical Service of Toronto General Hospital. Encouraged by Dr. K. G. McKenzie, patients were allowed up soon after they so desired. Later, Lt.-Col. W. V. Cone, R.C.A.M.C., stimulated our interest in tension exercises for patients in bed. McKenzie[9] has recently put forward his views concerning the value of early activity in minimizing the post-traumatic syndrome of headache and dizziness.

TABLE III.

CAIRNS		CANADIAN NEUROLOGICAL HOSPITAL	
Estimate of shortest time before return to full work is possible		*No. cases*	*Average time off duty*
P.T.A. 5 minutes to 1 hour.....	4 to 6 weeks	34	36 days
P.T.A. 1 to 24 hours.....	6 to 8 weeks	50	
P.T.A. 1 to 7 days.....	2 to 4 months	12	54 days
P.T.A. over 7 days.....	4 to 8 months	4	59 days

The average total time off duty, as shown by the figures in Table IIC. for Group 2 (P.T.A. minutes to 24 hours) and Group 3 (P.T.A. 1 to 7 days), is rather less than Cairns'[10] "Suggestions of the shortest time in which ability to carry out full work may be expected to return", as shown in Table III.

It is noteworthy that Guttmann's[11] figures for loss of working time in an unselected series of civilians are very similar to ours, where the P.T.A. is not more than 7 days. Comparison of our figures with those of Symonds and Ritchie Russell[2] is not satisfactory for they included penetrating wounds and intracranial hæmatomata in their series of patients.

The contrast between patients returning to duty and those invalided home in Group 3 (P.T.A. 1 to 7 days) and Group 4 (P.T.A. over 7 days) is sufficiently striking to warrant further scrutiny. Outstanding in the clinical findings of the patients unfit for all duty, in Groups 3 and 4, was the frequent occurrence of signs and symptoms of gross cerebral damage due to lesions such as cerebral contusion involving the Rolandic region or speech area, petechial hæmorrhage in brain-stem and the region of the third ventricle. Obstruction to the circulation of the cerebrospinal fluid has resulted in increasing hydrocephalus. Persisting mental deterioration and post-traumatic psychoses were seen only in patients with prolonged periods of coma, semi-coma and P.T.A. The conclusion seems reasonable that patients making relatively rapid and complete recovery after injuries severe enough to produce P.T.A. of 7 or more days, suffered mainly from profound cerebral concussion. The intimate nature of the application of force to the head was such that significant structural damage was not done to the brain. With recovery from the disturbance of cerebral function due to concussion these patients were sufficiently fit to return successfully to military duties. In contrast to this small group making a relatively rapid and complete recovery after long P.T.A. are those patients with residual paralysis, dysphasia, mental deterioration, cerebellar ataxia and the like. Such patients have, it seems, had pathological lesions involving functionally important cerebral structures superadded to concussion.

Headache.—The incidence of headache was reported by the regimental medical officers on the follow-up questionnaire. Twenty-nine out

of 125 men returned to duty were reported as complaining of occasional headaches. All were carrying on their duties efficiently and willingly. The headaches did not appear to be related to the severity of the head injury.

CONCLUSIONS

1. The duration of post-traumatic amnesia is the most consistent guide to the severity of a head injury.

2. Every effort should be made to supply the fluid and nutritional requirements of the comatose and semi-comatose patient. Dehydration is very rarely necessary.

3. The early institution of active physical training and supervised rehabilitation together with adequate explanation and a full measure of reassurance minimize the duration and degree of disability.

4. Headache has been an uncommon cause of continuing disability in this series of patients.

5. The efficient execution of the "active management" of cranio-cerebral injuries requires segregation of patients and a trained team including nursing sisters, orderlies, physiotherapists, physical instructors and occupational therapists in addition to the medical staff.

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ONE PENICILLIN PROBLEM MAY HAVE A SOLUTION.—A possible step toward solution of one of the difficult problems attending the use of penicillin has been made in the discovery that the usual rapid elimination of the drug from the body via the kidneys can be very greatly slowed down by the simultaneous injection of a complex organic compound known as para-aminohippuric acid. This discovery is reported (*Science*, August 4), by a research team consisting of Dr. Karl H. Beyer, Roland Woodward, Dr. Lawrence Peters, W. F. Verwey and Dr. P. A. Mattis, of the Medical Division of Sharp and Dohme, located at Glenolden, Pa. When dogs were given heavy "shots" of penicillin, the drug soon appeared in their kidney excretions and within a couple of hours was almost wholly absent from their blood plasma. However, when para-aminohippuric acid was administered along with the penicillin, the loss of the valuable germ-stopping drug through the kidneys was much slower, and blood tests indicated its far longer retention in the plasma, at effective concentration.—*Science News Letter*, September, 1944.

DEMEROL IN SURGERY AND OBSTETRICS

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DEMEROL* is a new synthetic proprietary drug derived from coal tar and has morphine-like and atropine-like properties. It was first synthesized and introduced by Eisleband Schaumann[21] in 1939 in Germany under the name of dolantin. The name, pethidine, was given to it by the General Medical Council in 1932 in Great Britain.[14] In the United States and Canada it is known under the proprietary name demerol.[25] It is known also as dolantol, eudolat, D-140 and isonipecaine.

This drug is the hydrochloride of the ethyl ester of 1-methyl-4-phenylpiperidine 4-carboxylic acid and was discovered during the search for an ideal analgesic with spasmolytic atropine-like properties. It is related chemically to atropine. It is a simpler compound than morphine but both possess a piperidine ring[15, 37] as seen from the following structural formula.

It is a colourless, crystalline powder, readily soluble in water, has a neutral reaction and a slightly bitter taste. It can be sterilized by a short period of boiling.

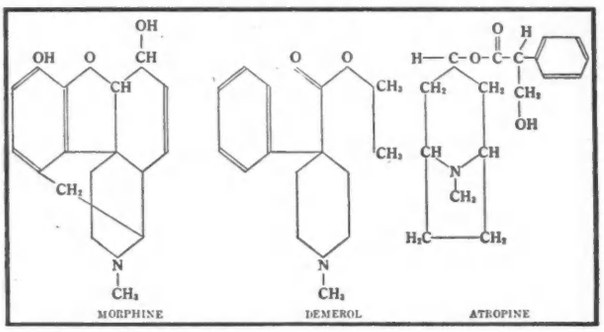
PHARMACOLOGY

The analgesic action of demerol was studied[9, 15] by measuring the pain threshold of the skin to varying intensities of thermal radiation from a lamp.[27] It was shown that 100 mgm. orally raised the pain threshold by 50% for as long as 6 hours. Fifty mgm. of demerol intramuscularly is twice as potent as 22 mgm. of codeine, and 100 mgm. parenterally approximates in analgesic potency to 1/6 gr. of morphine.[10] It is stimulating rather than depressing to the central nervous system[4, 35] but Guttman[26] reported its depressant effect on respiration and reflexes when administered to patients with intracranial lesions.

Demerol is reported to be effective as a spasmolytic[9, 15, 19, 37] on preparations of quiescent gut or that spastic to acetylcholine, histamine,

* Demerol used in this study was generously supplied by Winthrop Chemical Company.

and barium chloride. However, Gruber *et al.*[25] found the response unpredictable in several different types of preparations. Climenko[15] states that the spasmolytic effect is due partly to an atropine-like action on the parasympathetic nerve endings and partly to a direct smooth muscle depressant action similar to that of papaverine. It relieves visceral pain not only by raising the pain threshold but also by relaxing smooth muscle. Unlike the effect of morphine, demerol diminishes or abolishes the



segmental contractions and muscular tonicity of the intestine without altering its propulsive action.[10, 37] Its prolonged use does not result in constipation. Hence it is not effective in the treatment of diarrhœa and cannot replace opiates for this purpose. Intubation studies[9] have shown the spasmolytic effect of demerol on the human stomach, pylorus, and small and large intestines. Its antispasmodic effect on bronchial musculature in animals has been noted.[25, 37]

The antispasmodic effect of demerol on the intact ureter in animals and man has been demonstrated.[16] Studies on its effect on uterine muscle have produced conflicting results. Dreyer[18] found that it relaxes the intact and excised uterus but others[25, 39, 44] found that it stimulates the human uterus *in vivo* and animal uterus *in vitro,* whilst still others[12, 24, 34, 43] found that it had no effect on uterine contractions in the human pregnant uterus in ordinary doses.

The sedative effect of demerol in animals is reported to be weak[15, 19, 25] but is more pronounced when given parenterally.[9, 10] With larger parenteral doses sleep and drowsiness occur but this is of short duration and less than the period of analgesia and the patient can be easily aroused.[9, 10, 38] It does not produce a state of amnesia as morphine does[10] but Schumann[38] reported satisfactory amnesia in 70% of his cases. It has a potentiating effect on the hypnotic action of sodium evipal[5] and sodium pentothal.[36] It decreases the induction time and prolongs the anæsthetic time of nitrous oxide-oxygen[6] and decreases the amount of cyclopropane required to produce anæsthesia.[36]

Transitory respiratory depression in animals with the use of demerol has been reported[6, 19, 25, 37] and large intravenous doses may result in death by respiratory paralysis. In animals it lowers the blood pressure[6, 25, 37] and increases the volume of the limb and spleen.[25] It must disappear rapidly judging from the relatively short duration of analgesia and the appearance of the drug in small amounts in the urine.[33] It is believed to be destroyed by the liver,[6] possibly the first step being the hydrolysis of the ester group. To date no drug has been found to be incompatible with demerol and no disease is known in which its administration is contraindicated.[10]

CLINICAL STUDIES OF DEMEROL

A considerable amount of clinical study of the drug seems to have been done on the continent but most of these papers are not available on account of the war.[1, 12, 13, 21, 32, 37, 40] The use of demerol as a substitute for morphine in the treatment of postoperative pain has been reported by Batterman and Mulholland[11] who state: "Among the 164 patients receiving the drug parenterally during the postoperative periods after laparotomy 95.5% of the 182 trials resulted in complete satisfactory relief of the pain, discomfort and restlessness". Batterman[8] believes that the effect of 100 mgm. of demerol hypodermically is equal to that produced by 1/6 gr. of morphine. Favourable results from its use in minor surgery and in ambulatory patients,[14, 31] in preanæsthetic medication,[36] in neurological cases[2, 22, 26] and in general surgery[8, 28, 42] have been reported.

Rovenstine and Batterman[36] state:

> "Demerol appears to provide psychic sedation not surpassed by morphine, it does not depress respiration or other vital functions to the same degree as morphine does, it facilitates the induction of anæsthesia as does morphine, it is more effective in drying secretions than morphine, it has fewer unfavourable side effects and it reduces the usual amount of anæsthetic agent."

Demerol has received favourable reception particularly in obstetrics. In one series it is reported to shorten the time of labour notice-

ably in primiparæ, and produced adequate analgesia in from 70 to 80% of the patients[24, 38, 41] In combination with scopolamine it produced satisfactory amnesia in 60, 70 and 85% of cases in three different series.[23, 34, 38] Compared with morphine it is less of a respiratory depressant[9] and it exerts no demonstrable depressant effect on either full term or premature infants.[38] There is no mental depression, no urinary retention and no constipation following its use.[9]

In patients suffering from bronchial asthma and in whom morphine is contraindicated, 35 mgm. of demerol given parenterally has produced beneficial effects.[1, 28] A mixture of 35 mgm. of demerol and half the usual amount of epinephrine has given good results.[10] It has no sedative effect on cough, it produces no effect on the size of the pupil or ocular accommodation and it does not alter the basal metabolic rate.

The toxicity of demerol is relatively low even on intravenous injection, when it produces a fall in blood pressure apparently from peripheral vaso-dilatation.[25] No increased hazard has been demonstrated in association with the intravenous route.[38]

Demerol may be disagreeable to some[8, 10] but often it produces pleasant subjective effects and euphoria. This raises the question of addiction liability. Although some reports[13, 29, 30, 32] have suggested that it may be habit-forming, other investigators[8, 10] have not observed the development of physical dependence in the ordinary clinical use of the drug. Its addiction liability appears to be less than with morphine.[30]

Tolerance to demerol seems to develop rapidly for its sedative effect,[10] and in post-opiate addicts tolerance is rapidly gained to the pain-threshold-raising effects when large doses of demerol are given.[3] Tolerance was evident in two weeks and reached a maximum in eight weeks. In post-opiate addicts, demerol given[4] in large doses over a prolonged period produced effects similar to those observed in animals,[25] namely, exaggerated tremors graduating into muscle twitches, and finally into gross jerking of the extremities, hallucinations, increased sensitivity to sudden noise, and weakness in the extremities. However, in ordinary therapeutic dosage for analgesic effect, tolerance to demerol has not been evident.[10] On July 1, 1944, demerol was brought within the purview of the federal narcotic laws in the United States. Hence its use is subject to the same restrictions imposed on the use of narcotic drugs.[17]

DOSAGE AND ADMINISTRATION

In order to obtain greater sedative and amnesic effect, demerol has been used in combination with scopolamine or the barbiturates in the majority of cases. For the average patient receiving general anæsthetic 100 mgm. of demerol with gr. 1/100 to gr. 1/150 of scopolamine was given intramuscularly an hour before the operation. For patients receiving spinal anæsthetic 100 mgm. of demerol with gr. 1/100 of scopolamine 1½ hours before the operation and another 100 mgm. of the drug ½ hour before the operation were given. When the sedation was not sufficient with this scheme, another 50 mgm. was given in the operating room during the course of the operation.

Demerol 100 to 150 mgm. parenterally was used in combination with gr. 1½ to gr. 3 of nembutal orally, particularly for patients receiving spinal anæsthetic. Demerol 100 to 150 mgm. has been given alone especially for the patients receiving general anæsthetic, since it was found to decrease bronchial and salivary secretion even with ether anæsthetic.

It has been used in children as young as three years old as preoperative and postoperative medication in proportionately smaller doses. A child of 10 years old, of average build, received 50 to 75 mgm. of demerol, whilst a child of 5 years old received 25 to 35 mgm. of demerol. In children, it has been used also in combination with atropine.

Demerol was given intramuscularly as much as possible and by this route its effect was noticeable in about 20 minutes. Where more rapid response to the drug was desired the intravenous route has been used in 200 injections. It must be emphasized that when it was given by the vein, it was injected *slowly*, taking at least two full minutes to inject 100 mgm. (2 c.c.) and keeping a watch in front for timing! By this route its effect became noticeable almost immediately but at the same time incidence of its transient side actions was increased as described later. However, no significant harmful effect attends its intravenous usage.

PREOPERATIVE USE

The sedative effect of demerol with or without scopolamine began to appear in 15 to 20

minutes after intramuscular injections, as determined by the signs of apprehension being relieved, the patient becoming calmer and drowsy. However, even after 200 mgm. was given, a patient who had his eyes closed and was seemingly asleep with sonorous respiration responded readily when spoken to. The sedative effect seemed to last only one to two hours on the average. Fifty patients who received only demerol and 125 patients who received demerol and scopolamine as preanæsthetic medication before spinal anæsthetic were asked to recall incidents before the operation in either isolated or in orderly sequence. The following results were obtained.

TABLE I.

AMNESIC ACTION OF DEMEROL

	Demerol only		*Demerol and scopolamine*	
		%		%
Remember nothing	0	0	32	25.6
Unable to recall isolated incidents	16	32.0	60	48.0
Felt sleepy but recalled incidents in orderly sequence	27	54.0	33	26.4
No effect	7	14.0	0	0
Total	50		125	

This shows that demerol by itself has very little amnesic effect, although sedative effect is slightly more pronounced. Because of certain side actions of the demerol-scopolamine combination, demerol has been used in combination with nembutal, and their sedative effect is now under study.

Often during the course of the operation under spinal anæsthetic that lasted over an hour, the patient became apprehensive and restless and it became necessary to give more sedative; 1 to 2 c.c. of demerol slowly given intravenously quieted the patient within a few minutes and usually induced sleep, although the latter effect lasted only 30 or 45 minutes at times.

Although no quantitative study has been undertaken to determine the effect of demerol on the quantity of inhalation anæsthetic agents required, it has been our experience that a less amount of the anæsthetic agent is required for the induction and the maintenance of anæsthesia, that the induction is smoother and easier, and that the excitement and delirium of the second stage are greatly diminished. Nevertheless, these sedative effects of demerol are less than those of morphine.

The *analgesic effect* appears about the same as the hypnotic effect but it seems to last longer than the sedative effect. In 50 patients who received only demerol and in 125 patients who received the combination of demerol and scopolamine their skin sensation to pain was tested with a pin prick and the following results obtained.

TABLE II.

ANALGESIC EFFECT

	Demerol		*Demerol and scopolamine*	
		%		%
No pain	3	6.0	24	19.2
Slight pain	27	54.0	83	66.4
Painful	20	40.0	18	14.4
Total	50	100.0	125	100.0

This shows that although total analgesia may be possible in a few instances, the greatest clinically detectable analgesic action of demerol is the elevation of the peripheral pain threshold by about 50%.

The duration of the analgesic effect of the drug was roughly determined by the time interval that elapsed between the premedication and the first postoperative medication which was withheld until the patient started to complain of pain. Two hundred patients who had operations on the abdomen and lower extremities under various anæsthesias were compared with an equal number of patients who had undergone similar operations but who received morphine instead of demerol. Cases where the analgesic effect of the anæsthetic agent persisted as in many cases of nupercaine spinal anæsthesia were not included.

TABLE III.

DURATION OF ANALGESIC EFFECT

Time interval	*Demerol*		*Morphia*	
		%		%
2 hours and less	17	8.5	10	5.0
3 - 4 hours	62	31.0	36	18.0
4 - 5 hours	70	35.0	53	26.5
5 - 6 hours	21	10.5	55	27.5
6 hours and more	30	15.0	46	23.0
	200	100.0	200	100.0

It is seen from this that the duration of the analgesic effect of demerol lasts from 3 to 4 hours, whilst that of morphine lasts from 4 to 6 hours.

The analgesic effect of demerol is much more prominent than its hypnotic effect. This has been noted particularly in 7 cases of thyroidectomy where premedication consisted of demerol and basal anæsthetic induced with avertin rectally. Although cyclopropane was given in these cases the amount used was so small that it almost could have been dispensed with altogether.

Circulatory effect. — In those patients who were given only demerol no appreciable change in blood pressure nor in pulse rate that could be ascribed to the drug have been observed. When the drug was given intravenously often there has been a drop in blood pressure (usually 5 to 10 mm. of mercury in the systolic) and acceleration of pulse (100 to 120) and the patient became pale. But these effects were transient and usually subsided in 10 or 15 minutes.

When a combination of demerol and scopolamine was given, a rise in blood pressure, as much as 40 mm. of mercury in the systolic, and the acceleration of the pulse rate to 120 and 150 per minute have frequently been noted. These effects may be produced by scopolamine itself but when the scopolamine was combined with demerol, their circulatory effects were much more enhanced, as though there had been synergistic action between these two drugs.

Furthermore, when demerol and scopolamine were used as preanæsthetic medication, very often the drop in blood pressure after the spinal anæsthetic had been given was not as great as with morphine and did not occur so sharply.

Respiratory effect. — With the dosage of demerol employed in this study no untoward respiratory depression attributable to demerol has been observed. In order to evaluate the comparative effect of morphine and demerol on the respiration each of the 5 patients was given 150 mgm. of demerol and gr. ¼ of morphine on alternate days and their effects on blood pressure, pulse, respiratory rate, and girth of the chest at the nipple line were taken before and one hour after the drug was given. Six readings on each patient (3 for each drug) were taken and their average was as follows:

TABLE IV.

RESPIRATORY EFFECTS

	Without drug					
				Chest		
	Pulse	*Respiration*	*Blood pressure*	*Insp.*	*Exp.*	*Diff.*
Patient 1.	84	16	124/80	36¼″	35¼″	1″
Patient 2.	90	17	120/76	37⅛″	36¼″	⅞″
Patient 3.	78	14	126/78	35″	34¼″	¾″
Patient 4.	88	16	116/74	36″	35¼″	¾″
Patient 5.	80	15	124/78	34½″	33⅝″	⅞″
	Demerol					
Patient 1.	80	15	122/80	36¼″	35″	1¼″
Patient 2.	80	15	120/75	37⅛″	36″	1⅛″
Patient 3.	76	14	124/78	35″	34⅛″	⅞″
Patient 4.	80	16	116/76	36⅛″	35½″	⅝″
Patient 5.	80	14	124/78	34½″	33½″	1″
	Morphine					
Patient 1.	80	14	124/78	36⅛″	35″	1⅛″
Patient 2.	84	13	120/76	37″	36⅛″	⅞″
Patient 3.	72	12	120/76	35″	34¼″	¾″
Patient 4.	78	14	116/74	36″	35¼″	¾″
Patient 5.	78	12	120/76	34½″	34¾″	¾″

The above observation revealed that demerol does not cause as much respiratory depression as morphine and this has been well attested by our observation on 600 patients upon whom we used demerol either as preanæsthetic medication or analgesic. Among these cases there have been seven known cases of respiratory complications such as atelectasis, bronchopneumonia, and pleurisy; but in none of these cases has it been possible for us to attribute their occurrence to demerol. There has been no case of respiratory depression with cyanosis for which demerol can be held responsible.

This merit of demerol has been utilized in those patients who received one or two doses of morphine already and who still needed more for sedation and analgesia; 50 to 100 mgm. of demerol intravenously given slowly, usually produced the required effect promptly.

In 12 cases of Cæsarean section, 100 to 150 mgm. of demerol was used as preanæsthetic medication in combination with scopolamine or nembutal. In 10 of these 12 cases, the baby cried spontaneously immediately upon birth. In one case it took 25 seconds and in another 30 seconds for the babies to cry spontaneously. In

all of them, the skin colour of the baby was good and usually pinkish or slightly purplish.

Demerol did not seem to have much sedative effect upon the mucosa of the upper respiratory tract, since the cough reflex was much more active with demerol than with morphine. In those patients receiving ether the coughing and respiratory irregularities were more prominent with demerol during the second stage of anæsthesia. Furthermore, it did not seem to produce as much relaxation of the muscles of the jaw and pharynx as morphine does. Thus, with demerol as premedication slightly more difficulty was experienced in inserting the endotracheal tube because of inadequate relaxation, especially in those with short thick neck. In some patients, curare (intocostrin) had to be given intravenously in order to facilitate the intubation.

In doses of 100 and 150 mgm. demerol appeared to suppress the bronchial and salivary secretions even with ether anæsthesia; but with smaller doses it did not seem to have much effect. In the 40 patients who had only demerol (100 to 150 mgm.) premedication, 10 of them had a small amount of secretion under cyclopropane but not sufficient to cause any annoyance. In only three was there such an amount of secretion in the pharynx that the administration of the anæsthetic had to be interrupted in order to suction out the secretion. With demerol and scopolamine in combination, the secretion was markedly decreased, with resulting dry mouth, coated tongue, and parched lips. However, compared with atropine, its effect is much weaker in this respect.

It did not seem to have any effect on lachrymal secretion which is often stimulated by cyclopropane anæsthesia. Unlike morphine demerol did not cause any change in the size of the pupil.

POSTOPERATIVE USE

Demerol was used in 200 patients postoperatively as an analgesic in lieu of the opiates. The usual dosage prescribed was 100 mgm. every three hours. However, of 200 patients 97 did not obtain sufficient relief from pain with this dosage and either more demerol or morphine had to be given. Eight patients were given a total of 600 to 700 mgm. (12 to 14 c.c.) within the first 12 hours after the operation and in 57 patients 500 mgm. (10 c.c.) had to be given during a similar period. Morphine was given to the remainder of the 32 patients in one or more doses because of inadequate analgesia from demerol. The analgesic value of 100 mg. of demerol seemed to be equivalent to gr. 1/6 of morphine.

Even when the relief from pain was sufficient, a large number of patients were apprehensive and restless with demerol as postoperative medication. Consequently morphine had to be used instead of demerol more for the sedative effect of the former drug rather than for its analgesic effect.

Demerol is known to have spasmolytic action due to a direct papaverine-like depression of the muscle fibres as well as of the parasympathetic endings. In this respect demerol differs from morphine which increases the muscular tone of the stomach, small and large intestine and causes contraction of the pyloric sphincter, ileocæcal valve and anal sphincter. These effects of morphine along with lessened response to the normal sensory stimuli for the defæcation reflex contribute toward so-called morphine constipation.

In order to evaluate the comparative effects of demerol and morphine toward the intestinal and urinary bladder activity, 50 patients were selected who had either an appendectomy or herniorrhaphy under spinal anæsthetic and who received demerol as postoperative analgesic. This group was compared with another 50 patients who were operated on for similar conditions by the same surgeons, only they received morphine as postoperative medication. The results were as follows:

TABLE V.

INTESTINAL ACTIVITY

	Morphine		*Demerol*	
		%		%
Spontaneous bowel movement.	5	10.0	8	16.0
Enema returned effectual.....	39	78.0	42	84.0
Enema siphoned out.....	6	12.0	0	0
Total.....	50		50	

TABLE VI.

BLADDER ACTIVITY POSTOPERATIVELY

	Morphine		*Demerol*	
		%		%
Spontaneous urination.....	4	8.0	11	02.0
Catheterized once.....	36	72.0	35	72.0
Catheterized twice or more...	10	20.0	4	8.0
Total.....	50		50	

Although these series were not large enough nor sufficiently well controlled to warrant any definite conclusion, it seemed that demerol has slightly less constipating effect than morphine and that it lessened slightly the number of cases that needed to be catheterized.

The effect of demerol on intestinal activity was observed in one patient who had evisceration following breakdown of the laparotomy closure. One hundred mgm. given intravenously and repeated at the end of two hours caused no change in the peristalsis of the small bowel during the period of observation.

In four patients with well-functioning colostomy, the demerol had no appreciable effect on the activity of the intestine. In 25 patients undergoing laparotomy under spinal anæsthetic, the administration of demerol produced no apparent effect on the intestinal tonicity or peristalsis.

Six patients undergoing ureteral catheterization under spinal anæsthetic were given 100 mgm. of demerol intravenously and the effect of the drug on the urinary secretion of the kidney was observed. In all cases, there has been no appreciable change in the amount of urine. secreted.

THE USE OF DEMEROL IN OBSTETRICS

Schumann (1944) reviewed 1,000 cases of demerol and scopolamine in labour. He found an incidence of 70.5% where satisfactory amnesia was produced. He felt that it fell slightly short of the barbiturates in providing satisfactory amnesia. In his large series of cases demerol produced no depressant effect either on full-term or premature infants.

Review of 50 obstetrical cases at the Royal Victoria Montreal Maternity Hospital. — Fifty obstetrical cases in labour were observed under demerol. Twenty-five received demerol 100 mgm. every 4 hours and 25 received demerol 100 mgm. with scopolamine gr. 1/150 every 4 hours. Scopolamine was repeated only if indicated and usually in smaller doses. No alteration in blood pressure, pulse or fetal heart was noted and the sedation did not interfere with normal delivery. The voluntary expulsive pains were not diminished. Occasionally side-effects appeared such as nausea, vomiting and dizziness. No maternal respiratory depression was noted. A few cases were treated by alternating demerol and heroin and in these cases the analgesic effect was very satisfactory.

Demerol was in nearly every case given at the onset of labour and did not prolong or delay the progress of labour as judged by the frequency and strength of pains. Of the 50 cases, 30 demonstrated effective sedation, 11 fair sedation and 9 poor sedation.

Analysis of the 50 babies in this series revealed that 42 babies breathed and cried spontaneously. Eight babies required resuscitation because of cyanosis and lack of respiratory movements. Three of the babies that required resuscitation were mid-forcep deliveries for transverse arrests.

Our own personal impression is that the analgesic was more effective when demerol was supplemented with scopolamine, since this added a fair degree of amnesia.

Demerol in miscellaneous cases. — Because demerol was found to be relatively free of depressant effect on the respiration, it was used on a number of patients with pulmonary and cardiac conditions associated with dyspnœa. It seemed to have only very slight effect on the respiration, judging from the rate and the amplitude of the respiration and the colour of the patient. It usually produced satisfactory sedation but of much shorter duration as compared with morphine.

In 7 patients with uncontrollable hiccough for which usual therapy such as breathing into a bag, administration of CO_2 and of atropine did not have a beneficial effect; the administration of 100 mgm. of demerol promptly stopped the hiccough but in two cases it had to be repeated from two to three hours.

In 10 young women who suffered from dysmenorrhœa to such an extent that they were usually forced to go to bed, demerol was used as an analgesic in an oral dosage of 50 to 100 mgm. In 7 of these patients the response was quite satisfactory but in 3 others the relief from pain was only moderate. Several of them complained of dizziness. It was used reservedly in other young women who suffered from menstrual cramps but not to the extent that they were forced to take a bed rest. The relief from pain in these cases was satisfactory but because of the frequency of dizziness, it was used only with caution.

In 15 patients suffering from exacerbation of pain due to peptic ulcer or acute gastritis intravenous administration of demerol gave immediate and almost dramatic relief in all cases.

In several patients who have suffered from pain due to stones in the gall bladder, bile duct, and ureter, demerol was used instead of morphine. In all cases the relief was prompt and satisfactory and possibly better than with morphine because of the absence of the depressant effect of the latter drug.

Toxicity and side-effects.—With the dosage used in this study, no harmful effect attributable to demerol has been observed in any of the cases; but a number of undesirable side-effects have occurred. If these effects are not anticipated and the drug used indiscriminately they could be dangerous, or at least cause much annoyance.

The most frequent side-effects which occurred in 80% of the cases were dizziness and weakness, and in many cases they were longer in duration than the analgesic effect. However they caused very little inconvenience because the drug was used mostly in hospitalized cases in this study. Because of these effects, demerol should not be used for ambulatory cases or in the outpatient department. The next most frequent side-reaction was perspiration, which was at times quite profuse. Pallor and rapid pulse usually accompanied profuse perspiration. The incidence of nausea and vomiting occurred much less frequently than with morphine. Provided demerol was given slowly, even intravenous administration caused relatively few cases of nausea.

Demerol often caused acceleration of pulse and this was especially noticeable when it was given in combination with scopolamine. Furthermore, this often caused the elevation of blood pressure. Hence it should be used with reserve in cardiac and hypertensive cases.

Other less frequent side effects noted were euphoria, palpitation and substernal distress, restlessness, flushing of the face and respiratory depression.

In none of these cases has there been any signs of habituation or physical dependence on demerol; but there has been no case where it was used for periods longer than 10 or 12 days.

SUMMARY AND CONCLUSIONS

1. Demerol is effective as analgesic and as antispasmodic. Hence it may be used in lieu of opiates particularly in conditions where pain is due to smooth muscle spasm. Colicky pains of the bowel, pain due to stones in the bile ducts and ureter, peptic ulcer, and menstrual cramps are especially amenable to demerol. In postoperative cases its use seems to decrease the number of patients that need to be catheterized and it seems to have less constipating effect than morphine.

2. It has hardly any depressant effect upon the respiration when given in a dosage employed in this study. Hence it is particularly useful in those cases where respiratory depression needs to be avoided, as in high spinal anæsthesia, in pulmonary conditions and as preanæsthetic medication for inhalation anæsthesia and for Cæsarean section.

3. No harmful effects from the use of demerol have been observed in over 2,000 injections. Even when given intravenously no hazard has been experienced provided it is given slowly.

4. The sedative effect of demerol is weaker and shorter than that of morphine but this effect can be enhanced by quiet, dark environment and by combining its use with other drugs such as scopolamine and barbiturates.

5. Demerol decreases the bronchial and salivary secretion. Hence it is convenient as preanæsthetic medication for inhalation agent because it can be used in place of both morphine and atropine or scopolamine.

6. In 50 obstetrical cases, effective sedation was obtained in 30 cases, whilst fair sedation was present in 11 cases. It had no effect on the mother nor on the baby with respect to respiration and cardiac action. Analgesia was more effective when demerol was supplemented with scopolamine.

We wish to express our grateful acknowledgment to Drs. Wesley Bourne and P. E. O'Shaughnessy for their advice and guidance during the course of this study.

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THE OPERATIVE TREATMENT OF INJURIES TO THE SEMILUNAR CARTILAGES IN PERSONNEL OF THE BRITISH AIR FORCES*

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THE original title suggested to me for this paper was "End results in semilunar cartilage operations in the army". I suggested the change to—"in the Air Force"—as my experience in the service has been confined to that in the Royal Air Force overseas. After considerable deliberation I have again changed it to, "The examination, operative treatment and end results in injuries to the semilunar cartilages in the British Air Forces".

There are several reasons for these changes. The first was, of course, the fact that army and air force personnel are entirely different. They have different jobs to which to return after operation. The clear-cut orthopædic segregation of these patients in the Air Force did not obtain in the army overseas. The follow-up and case record system as established by our good friend Watson-Jones in the Royal Air Force, was not in common practice in the army. Secondly, we of the orthopædic service of the R.A.F. looked after the personnel of the air forces of the Dominions, the Colonies and many of our other allies in addition to those of the R.A.F. Thirdly, the mere recital of end results would be very tiresome, and more particularly if it was not known how these end results were obtained.

The surgeon interested in the knee joint wishes to know: (*a*) how to make the diagnosis of an injury to the meniscus, (*b*) what pitfalls there are to avoid and how to give a prognosis, (*c*) how to approach the joint and what to do when inside; and (*d*) what many do not know, and what is most important—the pre- and post-operative treatment. With all these points considered we should be able to restore nine patients out of ten to practically normal. I will present these points in turn.

DIAGNOSIS

Given a fairly adequate knowledge of the knee joint, its anatomy, its physiology and the mechanism of its derangement, one may proceed with the first important item, the history. This should be painstaking, patient and accurate. One could alliterate and say "painstaking, patient and precise". The type of injury and its mechanism is to be ascertained if possible. So far as the internal semilunar cartilage is concerned, it can nearly always be resolved into the standard mechanism of an internal rotation of the femur when flexed on the tibia, and when the foot is fixed. Examples: the mechanic, carrying a load on his shoulder and catching the inner side of his foot on an obstruction, falling with the knee abducted; the logger, or lumberjack as he is known in the east, gets his foot caught and falls, his body falling backward and rotating inward on the knee; the football player who has his foot on the ball when it is kicked out from under him; and the classical example of the rugger player who is tackled. They all work out the same. I might say that sports account for many of the internal derangements one encounters, particularly in the service.

The patient's feeling regarding the security or stability of the knee is quite important but here there should be a word of warning. The word "locking" should not be introduced in a leading question for at least two reasons. First, the conception of the meaning of the term may differ, and second, particularly in the service, or when dealing with patients on compensation, the "idea" of "locking" easily

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spreads. At one time in this war there was an extraordinary epidemic of "locking" knees in the British army and, at operation a distressing number of knees in which there were found normal cartilages. It is a very simple way for a serviceman to get several weeks off duty or even to obtain his discharge from the service. One need scarcely add that the removal of a normal cartilage does not noticeably improve a knee joint.

The history of immediate reaction, recurrence of attacks of symptoms, what causes these recurrences and the location of the pain is important.

PHYSICAL EXAMINATION

I have become accustomed to an absolute routine here:

1. Measurement of the thigh at 2 levels above the patella. The presence of atrophy is very suggestive of an internal derangement.
2. The presence or absence of fluid in the joint, and of local heat on palpation.
3. The range of movement: for instance a springy resistance at 20 or 15 degrees from complete extension is very suggestive of a complete bucket handle lesion. I consider a knee at 180 degrees to be in extension, (but check the other knee for hyperextension), and I measure flexion in the decreasing range.
4. Stability of the collateral ligaments tested in extension and of the cruciates tested at about 100 degrees.
5. Points of tenderness around the joint line and at the attachments of the collateral ligaments with the knee at 90 and 100 degrees, and at the same time a search for evidence of cyst formation.
6. Prof. McMurray's posterior horn test which I have found to be extremely reliable, and finally:
7. The patient standing, to examine the popliteal area for evidence of posterior herniation.

The last procedure—*which must be done*—is x-ray. This, speaking of course of injuries to the semilunar cartilage, should be negative. A narrowed joint space on one side cannot be taken as evidence of a displaced cartilage.

With a background of experience and the ability to appreciate findings a good score would be 9 out of 10 correct diagnoses. An almost perfect score is a correct diagnosis in 21 out of 22. I happen to know a man who has reported 6 mistakes in 136 cases, and I believe him, but I feel fairly well satisfied, but not quite, to miss only one in ten.

PIT-FALLS

The arthritic knee may simulate an internal derangement, particularly an internal posterior horn tear. Two points may be suggested as of value here. One is the x-ray and the second is found on physical examination. In the first, two features are to be considered. There is the tiny, almost microscopic pointing of the articular surface of the patella at either pole, usually the upper, and a later manifestation is the tiny pointing at the margin of the tibial plateau. The other and less definite feature is the more than usual flattening of the lower end of the femur, a lack of normal rotundity of the femoral condyles. This has been accepted by some of us as an indication of a predisposition to arthritis. The clinical feature is a trace of limitation at each extreme of the arc of motion with pain whenever extension or flexion are enforced. Of course, gross crepitus on movement need only be mentioned. I may say that in selected cases, one may operate on a questionably arthritic knee and get a good result. Indeed, not infrequently, one is forced to do an arthrotomy for an obviously torn cartilage in a mildly arthritic knee. However, it is a definite fact that arthritis in a knee joint detracts from a good prognosis.

The age of the patient is another factor which influences prognosis. In the service we were disinclined to operate on a patient over the age of 40 or 45 at the oldest. On occasion this rule had to be disregarded. In civil life this rule has to be disregarded much more frequently. I suggest that a patient over the age of 40 or 45 and who is a candidate for arthrotomy must be given a more guarded prognosis. Of course in military, naval or air force service, one has the advantage of operating on those of an ideal age group. A series in the service is, also, of necessity large by virtue of the fact that many in civil life may do damage to the menisci and seek no surgical advice. They suit their activities to their knees and so carry on. When they join up, they are unable to cope with the activities demanded of them and must seek the help of the medical officers. Hence the large series that we are able to accumulate and which no doubt, will be reported in the near future.

Another factor to bear in mind is the presence of a focus of infection in the patient with an

internal derangement of the knee. Of these foci, the teeth are the most important, the next in importance being infected tonsils or prostate. Now and then one removes an obviously torn cartilage and is later disturbed by a warmish tender knee in which effusion persists. The cue is to search for an infected condition elsewhere which has produced an infective process in the knee joint. The seed was there and the soil was prepared by the surgical interference. This has been the theme of a recent memorandum of mine to our Workmen's Compensation Board. I am quite convinced that in such insurance cases a financial gain will accrue to the Board and a physical gain to the patient by the elimination of foci of infection.

OPERATIVE PROCEDURE

May I preface this section by the observation that this has become completely standardized in the Royal Air Force among the members of the orthopædic service, and it is based on literally thousands of arthrotomies in whom very adequate case reports have been kept, complete with photographs of the specimens, x-ray prints, histories, operative findings and end results. These thousands of case reports will be an everlasting monument to our energetic, brilliant and tireless civilian consultant, Reginald Watson-Jones. Later, the co-ordinating force was H. Osmond Clarke—known to all as "Nobby"—and the spirit of co-operation in the orthopædic service was absolutely first class. Our individual differences were minor to a degree. Our cohesion was beyond belief for a group of medical men. And as such a group we agreed in almost everything, with everyone contributing to the cause. Hence, "our" operation on the knee joint.

We differed in a minor way on preparation. For example, some used gentian violet and some flavine in spirit. I preferred the latter as it was less messy. We differed on the use of stockingette as opposed to skin towels. I preferred the latter as I could see where I was going. We differed in the incision, straight, oblique, as opposed to slightly curved. I preferred the latter because a curve has more beauty than a straight line and I think gives a little better exposure. These are very minor differences. We all agreed on the essentials: A thorough preparation; two days' skin preparation. Here may I quote an old statement of Sir Robert Jones: "The surgeon who operates upon a healthy knee joint should be clean beyond reproach. He should have an antiseptic conscience. His finger should never enter the wound however scrubbed or thickly gloved, as an infection would prove a tragedy". With this background we approached the knee.

A tourniquet was always used. We did our theatre preps and drapes; two sheets and two towels. The knee flexed over the broken end of the table, with the foot controlled by the operator's knee. The incision well out from the patella bordering on the internal collateral ligament; you are lost if you stay too close to the patella. Fascia and capsule separated and incised separately and the joint opened from above downward. As the cartilage is approached, the joint should be inspected so that if visible, the lesion may be seen and described. In addition to this, (and we were always careful in our operation notes to be honest), the condition of the articular cartilage, the state of the attachment of the anterior cruciate, the lateral (or medial) joint appearance and the integrity or otherwise of the articular surface of the patella should be recorded in the dictated operative findings.

The whole cartilage, except in very exceptional circumstances, should be removed and it should be no reflection on the surgeon that a separate posterior incision has to be made in order to obtain the posterior horn. It is probably preferable that a faint thin peripheral rim be left. No time should be lost in the removal of a cartilage. The longer a joint is open, the poorer the result. In closing the joint I have adopted with benefit a procedure used in an American General Hospital in England. The capsule is lightly tacked with interrupted catgut for the anatomical reason that the lymphatics are situated between the deep fascia and the capsule. This allows any effusion to leak through the capsule and be absorbed. I lay no claim to this idea and I will gladly applaud its author when he puts it in print. The fascia is then snugly closed and the skin closed with interrupted sutures.

In my postoperative dressing I have acquired another useful trick from a very intimate friend and colleague, W/Cdr. J. C. Scott. After dressings have been applied, the joint is wrapped in cotton wool. Then an elastic type of bandage is wound on not too snugly. Now a red ribbon is placed lengthwise over it and then a second elastic bandage is wrapped on to

act as a compression bandage and it is really snug. At the end of twenty-four hours the compression bandage is removed and the red ribbon is the sign that the enthusiastic nurse or sister should desist and leave the second elastic bandage intact. It is rather useful and all nurses ask "why the red ribbon?"

The sutures are out on the 10th day and the patient allowed up. Most of them do very well. The odd one doesn't. I might add that if you have never been in trouble with a knee joint, you are not doing very many. I have often thought that a longer period of abstinence from weight-bearing might be beneficial.

PRE- AND POSTOPERATIVE TREATMENT

For the two days that the patient is in hospital undergoing preparation for arthrotomy he should be trained in quadriceps drill; and he should be told that he is to do rhythmic quadriceps exercises for five minutes every hour so that as soon as he is out of his anæsthetic he may start this exercise. I believe this is the most important factor in the treatment and recovery of a knee in which there has been an internal derangement. That is the only physical treatment that the vast majority of them receive. By the end of the second day the quadriceps should be showing up and contracting very well. By the third day the leg should be easily lifted off the bed. There should be little, if any, effusion, and complete extension and flexion to at least the right angle on the tenth day. It takes teaching but it is well worth it. We used to have a rehabilitation orderly on each ward teaching patients muscle movements and I think it is highly important. They do very well. I am trying to induce our local Compensation Board to employ such trainers for our hospitals; to do nothing else but teach and preach muscle activity to our injured men; to make them exercise the muscles above and below fractured bones—and to teach the drill of the quadriceps before and after operations on the knee joint. It pays. That is the pre- and postoperative care. Patient teaching, bullying and urging of quadriceps exercises.

END RESULTS

When I was asked some five months ago to read a paper on this subject I thought I would have ample time to obtain from England the end results in a few thousand cases. I wrote immediately but I have not yet received any end-result figures. I had not reckoned on the intensive second-front preparations and I realize now that I was asking rather overmuch of our hard-worked secretaries. The statistics are gradually growing and some one will publish them in due course. In the meanwhile you will have to accept my word for a report of an informal end-result study that was carried out in our service something over a year ago. As cartilage operations were so numerous and affected a definite proportion of our manpower we were all naturally interested, and my impression was that 90% of the patients made a complete recovery. For about two years I tabulated end-results when the case reports returned to the hospital following final disposition of the case. A general, and as I say, informal survey of some thousands of cases produced a figure of 93% returned to full duty in an average period of seven weeks. These figures may be revised when a complete study is undertaken but these end-result figures were put forward in a rather warm discussion at a meeting of the Royal Society in London a little over a year ago by Air Commodore Clarke. In any event, we were so satisfied with our results that we continued to do arthrotomies and seven in a day's list was not an uncommon event.

SUMMARY

We are interested in *good* results in arthrotomy for internal derangements of the knee joint. I maintain that they are in direct ratio to: (1) correct diagnosis, (2) absence of arthritic changes, clinically and in x-ray, with reservations, (3) the age of the patient, (4) the adequate and rapid removal of the torn meniscus.

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RÉSUMÉ

L'orthopédiste qui s'intéresse au genou doit vouloir savoir fairele diagnostic exact de blessure d'un ménisque, connaître les possibilités d'erreur, porter un pronostic précis, connaître la technique de la chirurgie du genou et être au courant des soins pré et post-opératoires. Une histoire détaillée du cas est essentielle. L'examen physique local bien fait conduit toujours au diagnostic exact qui sera confirmé par les rayons X. On devra se méfier des vieilles arthrites et des foyers infectieux situés ailleurs. La procédure chirurgicale est résumée dans ses traits essentiels. Les soins post-opératoires sont dominés par la nécessité du mouvement articulaire précoce. 93% des malades traités sont retournés à leur besogne.

JEAN SAUCIER

THE OPERATION OF AN INDUSTRIAL HEALTH SERVICE

By R. Vance Ward, M.D., F.R.C.P.(C)

Montreal

THE following presentation is the second of a series of eight articles which are appearing at monthly intervals in the *Journal** and which have for their object a discussion of the problems of Industrial Medicine. In this article we shall try to deal in a general way with the actual technique of running an industrial medical service—the relation to management, the activities which are carried on from day to day, and the personnel, space and equipment necessary to carry on these activities. The discussion of some of the activities will be brief at this point, but an indication will be given of much fuller treatment of various subjects in subsequent articles, of which six remain to be published.

THE RELATION OF AN INDUSTRIAL MEDICAL SERVICE TO MANAGEMENT

In nearly every industry large enough to consider the establishment of a medical service, one usually finds a division of responsibility under the president among executives interested respectively in production, sales and advertising, and personnel. In the case of a railway, these divisions become "operation, traffic and personnel" but the general set-up is much the same whether the industry is selling goods or services. Whether or not the most highly placed executive who deals with personnel problems is interested in other phases of management, we feel that it is to him that our industrial medical service should report directly. To this individual, our industrial physician looks for many things; the equipment necessary to carry on his work; the carrying out of general health measures recommended, and advice on the attitude of the management towards his efforts.

In very large industries, employing ten thousand or more people, one frequently finds a service department whose head is sometimes a physician. The medical health service reports directly to the service department, which includes in its activities, safety, recreation, cafeteria, sick benefits, group insurance, pension plans, legal aid and other things of similar nature.

THE ACTIVITIES OF AN INDUSTRIAL MEDICAL SERVICE

There is, of course, a wide variation in the scope of the work attempted by industrial medical services. At one extreme we have the factory which engages the services of a physician to come once a week to examine the employees for some specific industrial hazard, say lead poisoning. At the other, one sees the industry in some isolated outpost or in a little one-industry city which provides complete treatment for the employee and every member of his family. Between these two extremes there is a happy medium and the present Canadian standard of service has come to include the following activities: (1) pre-employment examinations; (2) periodical examinations; (3) first-aid and treatment of accidents for which the company is responsible; (4) first-aid in illness; (5) hygienic supervision of the plant; (6) health education; (7) visiting nursing service.

The pre-employment examination.—The first contact which the new employee has with the medical department is his pre-employment examination. Although some employers of labour have no doubt used such an examination as a means of picking out only the cream of the labour market, this approach could not possibly be justified, nor could it long endure against the opposition of organized labour. We feel that the objective of the examination should be the placement of the worker in the job he can do best. The man with a hernia can do 80% of the jobs in industry, but one would not put him at work requiring great physical effort. The girl with faulty vision has always been able to do many simple, routine jobs well, but inspection of a finished product is not one of them. It is the experience of most of us who are doing industrial medical work that the most interesting and fascinating work we have had to do in the past three years has been attempting to fit into jobs the severely handicapped workers sent to us by Selective Service, the blind, the deaf-mutes, and those who have had one or more major amputations.

The pre-employment examination finds its second use as the first of a series of periodical examinations. At this time we establish the

* For previous article see *Canad. M. Ass. J.*, 1944, 51: 439.

new employee's base-line of weight, height and vision. We should be able to detect those correctible defects—bad teeth, infected tonsils, poor vision—which he brings with him to his new job, and to advise him concerning their correction. In many cases, we make the correction of these defects a condition of employment.

At this first interview, the place of the industrial medical service in the life of the factory community is explained to the candidate, and the necessity of reporting for the treatment of trivial accidents is emphasized. Those totally unemployable because of progressive disease, *e.g.*, active tuberculosis, usually do not exceed 4%.

And now a word with regard to the scope and technique of the pre-employment examination. Speaking generally, it is simply a careful physical examination, with which every physician is familiar, recorded on a prepared card. A check-mark on the card denotes normal findings; abnormal conditions are written out in full. At times, when one is faced with a sudden rush of new candidates, the following system has been found to speed up the examination. The employee reports first to a nurse who records his name, age, sex, marital status, address, birthplace, date of employment and history. He next moves on to another nurse who takes his height, weight and vision. He then comes to the physician who is equipped with head-mirror and lamps, and, in the sitting position, has the examination of his ears with a speculum, of his eyes, nose, teeth, throat and neck. The blood pressure is recorded at this time, and the hands are examined for dermatitis, immobile joints and minor amputations. He next moves into a cubicle nearby where he undresses and lies down for the examination of heart, lungs, abdomen, legs and feet. Finally, he stands up for the inspection and palpation of the inguinal regions. By keeping two cubicles in constant operation, and by going to and fro between these spaces and his desk, the physician can make every minute tell and avoid the loss of time caused by the dressing and undressing of individual patients. A urinalysis should, of course, form a part of every examination.

More and more companies are requiring a chest x-ray and a Wassermann test on employment. No doubt, as the labour force of a given company becomes more stable after the war, this tendency will increase. Under present conditions 20 or 30% of the employees will have left before the reports of these procedures are back from the laboratory.

The periodical examination.—Volumes have been written about the periodical examination and it is now accepted as the most valuable positive measure directed towards the maintenance of the health of the normal individual. The industrial medical service is in a peculiarly fortunate position to bring this procedure to a group of people who have not otherwise been able to enjoy its benefits. Between child welfare and school health services and the routine examination of women by their obstetricians during their child-bearing years, a large part of the population has some health supervision more or less continuously. The male industrial employee, however, from the time he leaves school until he comes down with some serious illness rarely sees a physician unless he purchases life insurance or works for a company which maintains an industrial health service.

Here, as elsewhere, the object of the periodical examination is the detection of errors of habit and of abnormalities of structure and function, and advice on the correction of those which can be corrected. As we pointed out above, we like to think of the pre-employment examination as only the first of a series of periodical examinations conducted throughout the whole term of the individual's employment.

Since mass surveys for the clinical and x-ray detection of tuberculosis have been growing in popularity, the well established industrial health service, with its records of weight, exposure to disease and history of illness, has come to be the main channel of approach to a large group of individuals. No further discussion of this point will be undertaken, as one complete paper of the eight to be presented will be devoted to a discussion of the respiratory diseases, such as the common cold, but chiefly tuberculosis. Similarly, the sixth article will deal with the place of the industrial medical service in the control of the venereal diseases.

First-aid and the treatment of accidents.—Eight of the nine Canadian Provinces have Workmen's Compensation Acts or Employers' Liability Acts which put the responsibility for

the treatment and compensation of accidents squarely on the shoulders of industry. The carrying out of these tasks has become almost entirely a function of the industrial medical service; in fact, it was the recognition of this responsibility which led to the establishment of the first of these medical services.

For every industrial accident which requires hospitalization and skilled surgical care, there are a hundred of the type which, happening at home or in the street, would never reach the level of medical care at all. Because of the factor of infection, however, these accidents in the aggregate cause a large annual toll of suffering, expense and loss of time. The establishment of adequate first-aid treatment of these minor injuries — scratches, bruises, sprains, splinters, foreign bodies in the eyes— is the first duty of the physician in charge of an industrial medical service. Given such care throughout every hour of the working day, we have personally found it possible to go for a period of nine years with only eighteen days lost from infection by seven cases. It is perhaps needless to point out that the responsibility in this regard is a double one: first, to educate the employees to report trivial injuries at once, and second, to provide the proper treatment of these injuries.

In the case of the more serious injuries, the industrial physician usually cares for them as far as his own surgical competence will permit him to do so. In fact, one may say that a realization of his own limitations along these lines is one of the prime requisites of one holding such a position.

The treatment of industrial accidents of a certain kind provides the only occasion on which the industrial physician goes into the homes of the employees. The type of accident referred to is that which is too slight to need hospitalization, but which, on account of the part of the body involved, hinders the mobility of the patient, *i.e.*, a minor cut of the foot or leg.

A detailed discussion of minor traumatic surgery is not within the scope of this article, but one point is worthy of mention. Many injuries which appear to be trivial to the physician or nurse are productive of a good deal of pain to the patient for two or three days. The routine provision of mild sedatives for the first two or three nights will save many a sleepless hour and earn the grateful thanks of the injured employee.

First-aid in illness in the industrial medical service.—Although there is substantial agreement among members of the medical profession on the subject of many of the activities undertaken by the industrial medical service, such agreement has not been reached on the rôle which such a service should fill in the treatment of non-industrial illness. As one surveys the field of health services in industry, one is impressed by the wide variation in the scope of the work attempted. On the one hand, in certain "one-industry" towns, the employee need spend not a single cent for medical care for himself or for any member of his family if he wishes to take advantage of the service provided by his industry. Such a broad service is rather common in outlying districts, for example, in some of the industrial communities on the north shore of the St. Lawrence River, far removed from road and rail transportation. One or two large industries operating in the large cities of Canada provide medical service in the home for the employees (although not for their families). At the other end of the scale, we find the industrial medical set-up which concerns itself exclusively with occupational illness and injury.

As a general rule, the individual physician does not attempt to treat the employee in his own home. Such a service would appear to be quite impossible under present conditions, where a large, newly-established munition plant draws its workers from a radius of thirty miles or more. The care of these workers, when they are ill in their own homes, must of necessity be undertaken by a physician who lives and works in their own residential neighbourhood.

Even with regard to the amount and character of medical treatment which ought to be undertaken at the factory hospital there is a good deal of difference of opinion. Authoritative statements of opinion, both in England and the United States, have held that no such treatment should be given. In Canada, a middle course has seemed to be best. To quote from the 1942 annual report of the Committee of Industrial Medicine of the Canadian Medical Association, approved by Council:

> "Industrial medicine is taken in principle to include preventive medicine and hygiene in factories, palliative treatment in sickness occurring in the factory, the recognition and control of occupational diseases, the control of infection in accidents and of accidents themselves."

As a matter of fact, in actual practice it is very difficult for the physician in charge of a well-equipped and adequately staffed industrial medical service to refuse to give any treatment of illness. Not only is there a constant demand from the employees for such treatment, but it is quite apparent, both to the physician and to the management, how much more valuable the service is to all concerned if some treatment is undertaken. The border line between the advice given to prevent illness and that given to relieve symptoms already established is a hazy and ill-defined one.

There are two broad classes of cases in which the medical service in industry can be of considerable value along therapeutic lines. The first class comprises those minor symptoms which cause a good deal of discomfort and loss of efficiency but which, in most instances, would never be taken to a physician if a fee had to be paid. The principal symptoms of this type of which one thinks are cough of short duration, acute rhino-pharyngitis, foreign body in the eye, wax in the ears, minor digestive upsets, diarrhœa, dysmenorrhœa, and the many aches and pains about muscles and joints of which so many people complain, either after they have undertaken some unaccustomed exercise or at the onset of an acute upper respiratory infection. The keynote to the successful treatment of these minor symptoms is the carefully planned provision in the factory hospital of standard remedies for the above conditions, excellent in quality and adequate in quantity.

When large numbers of employees (several hundred each day) are seeking such treatment, most of them must perforce be attended to by nurses. Under these conditions, certain safeguards must be set up. For example, we make it a hard and fast rule that the nurse shall not undertake the treatment of any symptoms referable to the respiratory or gastro-intestinal tract without first taking the patient's temperature; if there is any fever, the case is referred to the physician for more careful investigation. A second rule is that in every case of digestive disturbance, the nurse must enquire whether or not there is abdominal pain; if there has been such pain in the past twenty-four hours, a cathartic must not be administered under any circumstances.

The fact that the treatment of these minor ailments is administered without doing a complete physical examination in every case is the basis of most of the serious criticism of the industrial medical service. Accompanied by grave shaking of the head, one often hears a statement like this: "Mr. A. came down with pneumonia last night, and only the day before the nurse at the plant had given him a dose of cough medicine." Let us be quite bold in our defence and state that a dose of good cough medicine is excellent therapy at the onset of pneumonia.

It is often stated further that the practice of giving palliative treatment of symptoms delays, in many cases, the diagnosis of chronic but curable diseases. In the presence of adequate records, however, the constant reporting of symptoms to one doctor or one nurse is an aid, not a hindrance, to the establishment of a diagnosis. No industrial physician, competent to fill his position, will fail to be impressed when John Jones comes down to the hospital seeking bicarbonate of soda at precisely eleven o'clock each morning and four o'clock each afternoon.

No industrial medical service can be called satisfactory unless good and accurate records of lost time from illness are kept. A careful review of the records and sympathetic consideration of the constant flow of complaints from alert foremen, concerning the work of various employees, will give the factory doctor reason to suspect the possibility of organic illness long before the victim himself decides that he needs medical attention. Speaking generally, the closer one is to an employee's work, the more quickly one is aware of departure from his normal health. Long experience has taught us never to disregard a tip on a man's health from his immediate superior. A good rule is this: "If the foreman says he is ill, he probably is".

Finally, in defence of the methods of the factory hospital, let us admit that, through the pre-employment and periodical examinations, more frequent complete physical examinations are done on an average employee than he would have at the hands of his private physician in the same period of time.

The second class of case in which the industrial medical service may, with advantage, enter the field of therapeutics is that in which certain measures of treatment, mostly dietetic, are closely related to the work routine of the individual. One thinks, first of all, of the large number of employees who suffer from

peptic ulcer or from its precursor condition, hyperacidity with hunger pain. The private physician must be content with advising the sufferer to take frequent meals. The industrial physician, on the other hand, is in a position to tell the patient that arrangements have been made for him to leave his work at certain definite hours and come to the factory cafeteria where he will be furnished with milk or any other suitable article of diet. In our experience, the family physician frequently writes in to request the co-operation of the factory physician in furnishing this service. It has long been our custom to include in the "milk-class" not only those sufferers from hyperacidity and ulcer but also those girls who cannot otherwise gain weight and those employees who are temporarily deprived of a normal diet following extensive dental extractions.

Coming under this general heading is the industrial physician's work as a psychiatrist or mental hygienist. So many mental upsets are related to maladjustments associated with the patients' work that the physician with the most intimate knowledge of the work relationships of the individual is in the best position to attempt a solution.

Hygienic supervision of the plant.—One of the prime responsibilities of the industrial physician is the active oversight of all those physical conditions of work which have a bearing on the comfort and health of the employee—cleanliness, good plant "housekeeping", heat, cold, humidity, dust, specific industrial poisons, and adequate plumbing and wash-room facilities. In our experience, the management which has the foresight to establish an industrial medical service expects from the physician in charge not a passive but an active interest in such matters. They expect him not only to answer yes or no when they enquire whether some condition should be improved, but to seek out aggressively conditions which are not satisfactory and urge their improvement.

It is rare to find in one industry more than two or three serious, specific hazards of industrial poisoning. The first duty of the doctor who takes over the supervision of any plant is to make himself an expert in the diagnosis, prevention and treatment of any such industrial disease which exists in his plant; this he can do through reading one of the many excellent works on the subject or, better still, by going to work for a short time with some other physician who has had a longer experience in the control of the specific hazard.

These general considerations conclude our present discussion on the control of the physical conditions of work. The whole of the fourth article of the series will be devoted to this subject and will be entitled "Industrial Environmental Control".

Health education of the employees.—There are many excellent measures available for what we may call the "mass education" of employees in the principles of good health habits—posters, moving pictures, pay envelop inserts. We were formerly dependent largely on American sources for this material but recently the Health League of Canada has produced a striking series of posters which are available regularly at modest prices.

With all due deference to mass methods, we feel the positive, individual advice by the doctor or nurse to the person who needs it is by far the most fruitful effort we can make in health education. Such advice is, of course, best given at the time of the periodical examination. A poster calling attention to the dangers of overweight may be read by every person in the plant, but its message is 80% wasted for only a fifth of the population has this impairment. On the other hand, a few words of advice from the doctor to the overweight person at the time of his routine examination is directed 100% in the right course. Nowhere is this point more evident than in the task of promoting body cleanliness where the struggle to combat dirt and infestation begins for the doctor in the case of male employees and for the nurse in the case of females on the day of the pre-employment examination.

The visiting nursing service.—The next article, the third of this series, will deal with the field of industrial nursing and will include a full discussion of the duties and qualifications of the visiting nurse. There is one point, however, which merits consideration here and this is the keeping of accurate records of lost time from illness and its causes. Only by keeping such records is it possible to determine the effectiveness of the work done and to point the way for new measures which should be undertaken.

The regulations of many plants require that before an employee receives a pass out to go home on account of sickness, he must first re-

port to the factory hospital; there a record is made of the nature of his illness. Should his illness begin during his hours at home, he is required to report to the factory hospital as soon as he returns. The foreman telephones the nurse each morning the names of all absentees, and the nurse visits the homes of all employees absent three days or longer. At the factory hospital, the record of the absentees is kept for each month on a sheet much like a school attendance register. For each day of absence a check is made, and when the employee finally returns the diagnosis is inscribed in the last column. At the end of the month, it is a simple matter, given the number of man-days worked, to compute the percentage of lost time from sickness for the month and to tabulate the days lost from various causes according to the International Classification of Causes of Death. Before such classification is made, a considerable amount of editing is done by the physician in charge of the plant to eliminate unsatisfactory diagnoses in the light of his knowledge of the case and of further developments of the case itself. Thus the case originally inscribed "indigestion" may become "carcinoma of the stomach" before it is included in our final records, and the occasional "cold" may be finally inscribed "tuberculosis".

THE PERSONNEL AND EQUIPMENT NECESSARY

Experience has shown that in order to carry out the program outlined above, we need the attendance of a physician at the factory hospital for one hour weekly per eighty employees in the group. The services of one nurse are necessary for each thousand employees. As the number of employees increases, the number which can be cared for by one nurse tends to increase too, so two nurses can often handle the work in a plant with a personnel of 2,700. The addition of an intelligent clerical helper, who can keep records, write reports, arrange appointments, and weigh and measure employees, will add materially to the number of people whose welfare can be supervised by one nurse.

The choice of a location for the factory hospital is important. It should be of ample size and have the benefit of outside light and ventilation. Care should be taken to choose a site as free from outside traffic and internal machinery noise as possible. Given two locations which seem to be satisfactory, the one should be chosen which is nearer to the centre of maximum concentration of employees in the plant.

The following rooms and equipment should be provided:

1. A waiting-room.

2. The nurses' office and admitting-room, containing the usual desk and chairs, and the cabinets in which individual card records are kept.

3. The main working-room of the suite in which most of the dressings are done and treatments administered. This room must be furnished with running hot and cold water, a foot-bath, the usual dressing-table units and chairs, the sterilizer and the storage space for drugs, instruments, linen and supplies.

4. An office for the physician containing the usual office furniture, height-weight scale, vision chart and examining-table.

5. Cubicles or screened-off spaces containing beds for the recovery of employees temporarily indisposed. Many physicians and nurses, who have not themselves worked as factory employees in their earlier years, do not appreciate the strain to which many people are subjected in keeping up with modern machinery and mass-production methods. Given the combination of a temporary speed-up, a hot day and some mild individual indisposition, such as a cold or a menstrual period, many employees are simply unable to carry on for a time. With bed-rest in a quiet, cool room, and a remedy appropriate to their symptoms, the majority are able to resume work within an hour or two and finish the day. Generally speaking, one recovery-room for each thousand male employees, and one for each five hundred women should prove sufficient, leaving a substantial margin of vacancy for the use of the rooms for pre-employment examinations as outlined in the section dealing with that subject. This accommodation would be severely taxed only on two or three of the hottest days of the year or in the event of a serious accident involving several employees.

Since major surgery is not attempted, the number of instruments needed is not large and they are the ones usually found in a well-equipped doctor's office. The choice of drugs stocked for the treatment of minor illness, as outlined above, is one for the individual physician concerned. Probably fifteen or twenty really satisfactory remedies which have stood the test of time will suffice to combat most of

the symptoms whose treatment is commonly undertaken.

In most plants large enough to consider the establishment of a health service, there is a chemical laboratory, and the physician would do well to bespeak for himself a corner of this room where he can do his own urinalyses and blood counts. Failing this, modest laboratory facilities should be provided in the hospital suite.

One final word on a subject which will appear often in this series is not out of place here. The personnel of the industrial medical service and the factory management must understand thoroughly the necessity for maintaining the same confidential relationship between physician and patient that is the rule in private practice. The record cards of individuals should be open to the inspection only of the physician and nurses, and communications to the management should be limited to statements that a given employee is or is not capable of doing a given job.

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RÉSUMÉ

Cet article est le second d'une série de huit sur la médecine industrielle; il est consacré à la revue générale de la technique du service médical industriel.

Le service médical doit faire rapport et obtenir la collaboration d'un chef; très souvent, celui-ci est le président de la compagnie.

Les activités d'un service médical industriel bien organisé comprennent: l'examen avant l'embauchage, les examens périodiques, les soins d'urgence et le traitement des accidents survenus pendant le travail, les premiers soins en maladie, l'inspection et le contrôle hygiénique de l'usine, les conférences d'hygiène et le service des infirmières visiteuses.

Pour arriver à ces fins, il faut s'assurer à l'usine les services d'un médecin à raison d'une heure par semaine pour chaque groupe de 80 employés, et d'une infirmière pour 1,000. Un commis supplémentaire remplit les fonctions d'archiviste et classe les dossiers. L'hôpital de l'usine sera situé loin du bruit et bien ensoleillé. Il comprendra en miniature l'essentiel d'un service de chirurgie et des principales spécialités; quelques lits seront à la disposition des employés momentanément souffrants et quelque 15 à 20 médicaments usuels suffiront. Un petit laboratoire est souvent ajouté. La discrétion à l'égard de l'employé sera toujours observée.

JEAN SAUCIER

Canada has reduced smallpox, typhoid fever and diphtheria to the status of rare diseases. Tuberculosis is being overcome. Venereal disease is the next plague to go! The backbone of the health sector (in attacking venereal disease) is the fact that syphilis and gonorrhœa are curable and preventable—a fact that cannot be reiterated too often or too loudly. The word "curable" is the artillery, the word "preventable" the infantry of the health thrust.—*Canad. J. Pub. Health*, June, 1943, p. 261.

THE DANGERS OF THE INCORRECT USE OF IODINE IN GOITRE TREATMENT*

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THERE are two distinct types of goitre, the diffuse and the nodular. In the diffuse form all parts of the gland participate uniformly in the disorder. Some patients have no disturbance in general health; others have the well-known stigmata of goitre toxicity such as nervousness, palpitation, tachycardia, sweating, loss of weight, ocular signs, tremor, and persistently elevated basal metabolism. In nodular goitre the organ contains encapsulated nodes separated by thyroid tissue and, again, the patients may or may not have the signs and symptoms of toxicity.

In nodular goitre it is the rule to advise surgical removal of all the nodules, whether the patient shows toxicity or not, and there are four good reasons for taking this stand. In the first place, no other known form of treatment is effective. Secondly, progressive enlargement may lead to undesirable pressure effects. Furthermore, a state of toxicity, if not already present, may come on at any time. Finally, malignant change may actually be present, or may develop later.

So little is understood about the details of the nature and genesis of the toxic state, whether it accompanies a diffuse or a nodular goitre, that we have never been able to use a specific remedy against it. We have been forced, in our ignorance, to attempt to produce a remission in these toxic signs and symptoms, to diminish them, or to hold them in check for a time until the body has a chance to recover.

Three methods of inducing a remission in toxicity have proved of value.

1. The first in point of time has been the administration of iodine, leading to the so-called "iodine remission". There appears to be a distinct difference in the iodine remission in the diffuse and in the nodular goitres. In the former (the diffuse goitres, including the exoph-

* Read at the Seventy-fifth Annual Meeting of the Canadian Medical Association, Section of Surgery, Toronto, Ont., May 24, 1944.

thalmic form), a rapid steady decline in the toxicity usually begins as soon as the treatment is started, and continues for about ten days. The basal metabolic rate falls, the pulse slows, the body weight rises, the nervousness subsides, and tremor and sweating diminish. These changes are accompanied by a hardening of the gland due to the storage of colloid material, and it has been found that the tenth day after beginning iodine therapy is on the average the correct time for surgical operation. If for any reason operation is not carried out at this optimum period, and if iodine therapy is continued, the drug seems to lose its beneficial effect, the toxicity returns, and a state of chronic illness is induced. The patient then enters a difficult refractory phase in which it is dangerous to operate and equally hazardous to stop the iodine administration.

In the case of nodular goitre with toxicity the response to iodine therapy, according to most observers, is less certain and always slower and less pronounced than in the diffuse form. In fact, there is a current opinion that patients with nodular goitre with toxicity may be made worse by the administration of iodine, and I am satisfied that I have observed this occurrence.

In lymphadenoid goitre we have rarely been able to obtain a satisfactory iodine remission.

2. The second method, "surgical remission after adequate iodine medication" has given us our greatest triumphs in our attempts to relieve this toxic state. As is well known from the results of thousands of cases, the operative mortality is low, and the percentage of permanent remissions is so high that this method has been accepted by common consent as the best that can be offered at the present time, in spite of the risks of myxœdema, tetany, and vocal cord paralysis.

3. There has been a prolonged and vigorous search for some method of producing a "pharmacological remission" that will replace our somewhat crude "surgical remission following iodine medication". It has long been felt that there must be some better way of correcting the disorders in physiology than those we now employ. Within the last two years a new series of substances has been discovered that will depress the basal metabolism, and of these thiouracil at the moment leads in promise. It is the opinion of Astwood,[1] and this view is steadily gaining support, that thiouracil prevents the synthesis of thyroxin. Thiouracil has been thoroughly tested in animals, and at the moment is undergoing clinical trial. The time is possibly rapidly approaching when thiouracil, or some other product, will be in our hands, and iodine will no longer occupy its present dominant position. But we must leave this tempting subject for the moment. Irresponsible prophecy is easy and entertaining, but our tested orthodox remedy is still iodine. Before we think of adopting a new agent it would be wise to cast an appraising eye over the subject of iodine, and the remission that it can be made to produce. Like most of our medicaments it has advantages and drawbacks. My task is now to call your attention to the alleged dangers of iodine therapy that have been the subject of prolonged and at times acrimonious debate. We can thus get ready to evaluate critically any proposed remedy by comparing its virtues and its defects with those or iodine.

It is likely that iodine was included in most of the empirical conglomerations that were concocted to treat goitre in antiquity, but it was Coindet[2] of Geneva who in 1820 first recognized that the element itself was the active constituent of the effective goitre remedies. In his memoirs he described cases with and without toxicity that were benefited by its use.

Trousseau[3] in 1863, by accident, prescribed tincture of iodine instead of digitalis for a patient with exophthalmic goitre. It would appear that he was alert to certain hazards in prescribing iodine for such a patient, for he writes: "preoccupied with the idea that there would be some danger in giving iodine, I wrote iodine instead of digitalis" on the prescription. He then described in unmistakable terms the characteristic beneficial response.

The English-speaking surgical world was startled and stirred in 1910 by a vigorous denunciation of iodine as a goitre remedy. The occasion was so important, a meeting of the British Medical Association in London, and the accuser, Theodore Kocher,[4] was of such stature in the surgical world, that the danger of inducing "iodine thyrotoxicosis" immediately became common belief. Little was published about iodine as a goitre remedy for the next decade.

But the advances in biological chemistry (*e.g.*, the discovery that the thyroid in Graves' disease contains no iodine), and in experimental medicine (*e.g.*, the capacity of iodine to prevent experimental goitre) slowly provided logical grounds for re-establishing iodine therapy in a

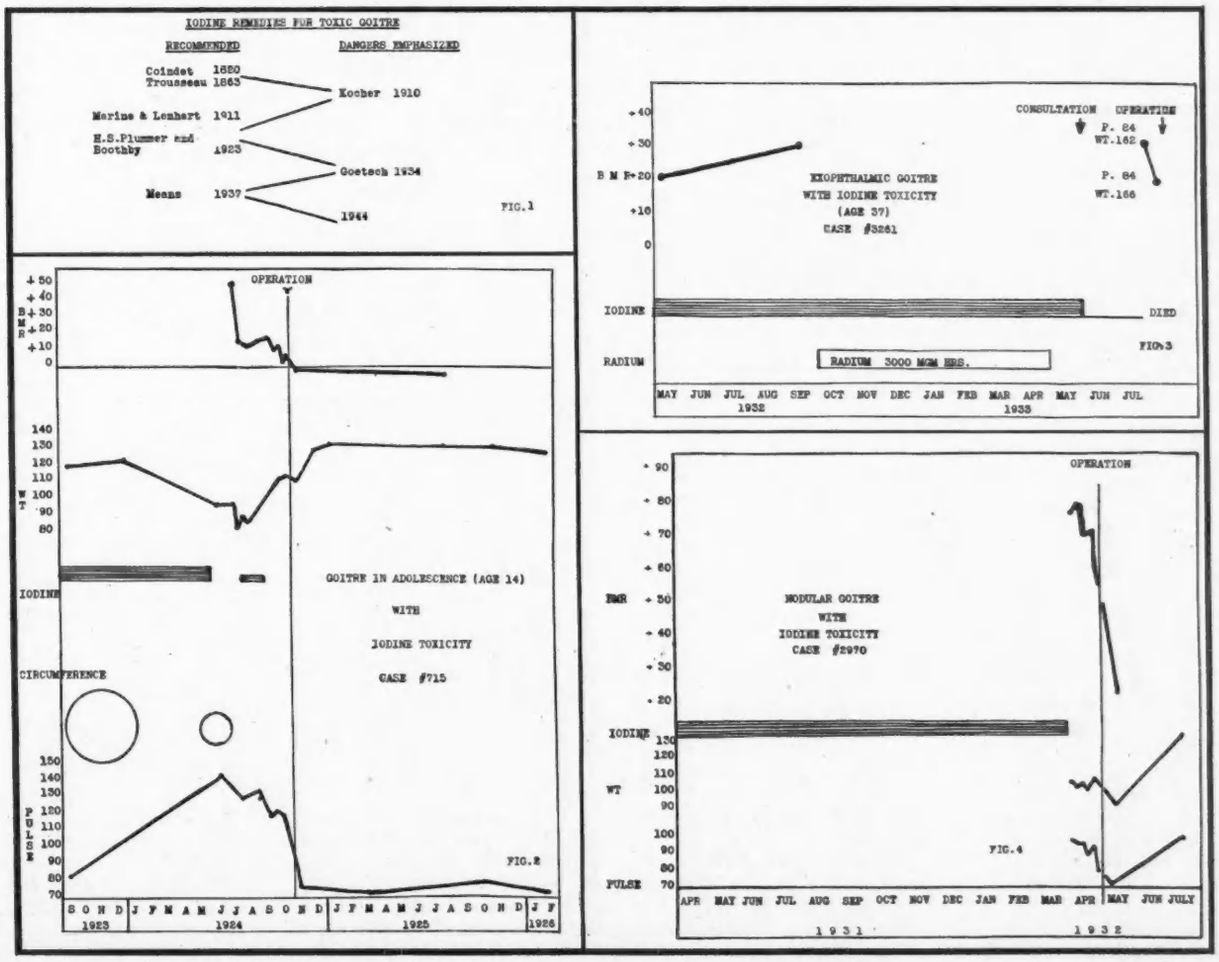
rational position. Marine and Lenhart[5] advocated the use of small doses of iodine in toxic goitre in 1911 but their advice went unheeded in the shadow of Kocher's denunciation. It was not until 1923, when H. S. Plummer and Boothby[6] brought before the profession a series of 600 cases, that the value of iodine-induced remission in toxicity as a preparation for operation, was fully realized, and from that time till the present it has dominated the field of preoperative toxic goitre medication.

Although Plummer and Boothby recommended the administration of small quantities of iodine, with warning against excessive dosage, and although they drew a sharp distinction between diffuse exophthalmic goitre that benefited quickly and constantly, and the nodular toxic disease that did not, these points were not universally appreciated or remembered. In consequence there followed a period of misuse and overdosage leading to so many instances of "iodine thyrotoxicosis" that a whole series of warnings and criticisms appeared. Typical of these was the paper of Goetsch[7] in 1927 which vigorously attacked the incorrect use of iodine, blaming it for creating a condition of aggravated intoxication which threw away the chance of producing a lasting remission by surgical operation.

The lessons contained in these publications were so well learned that "iodine thyrotoxicosis" soon lost its place as a topic of active discussion in the surgical literature. Fewer and fewer cases appeared in the clinics, and Means,[8] in 1937, with all the authority of his wide experience, stated in his book "The Thyroid and its Diseases", "we feel that the causal relationship between ingested iodine and subsequent thyrotoxicosis has not been conclusively proved. We doubt . . . the existence of iodbasedow."

Fig. 1 shows in zigzag form that in the course of this discussion up to the present time, the proponents of iodine medication have all been physicians; the warnings against misuse have all come from surgeons.

The records of the clinic in which I have the privilege of working cover over 4,800 cases in a period of some 22 years. The workers in the clinic believe that iodine thyrotoxicosis does exist, that it has been observed many times in the course of treatment of these patients, but



that its existence is not susceptible of proof. In order to establish conclusively that a given patient is the victim of iodine thyrotoxicosis it would be necessary to relieve the toxic state by withdrawing all iodine for a long period, to administer it anew and produce toxicity, to stop it again and produce another remission, and to obtain histological sections by biopsy at each stage. We have never felt entitled to embark on this variety of experimental therapeutics. Furthermore, there is the difficulty that iodine intoxication, once it is induced, is likely to continue for a long time after the drug has been withdrawn.

It would summarize our opinion to say that we have a broad general impression that many patients have come to the clinic in a state of toxicity that has appeared simultaneously with the administration of large doses of iodine over long periods, and to quote a few case reports for your consideration.

CASE 1

Female, aged 14 years. Milliner's assistant. Adolescent goitre with iodine toxicity (Fig. 2).

September 26, 1923. — Complaints: enlarged neck, three months' duration. No symptoms. Weight 120. Generalized thyroid enlargement. No pulsation, thrill or bruit. Circumference 38 cm. Sodium iodide gr. v b.i.d. prescribed.

October 22.—Circumference of neck 36 cm., sodium iodide continued.

December 18.—Weight 125. Circumference of neck 35 cm., sodium iodide continued. This patient did not report regularly, as instructed, but continued to take iodine without supervision for 6 months.

June 9, 1924.—Weight 98. Circumference of neck 32 cm. Gland hard. No bruit. Basal metabolic rate plus 52. Iodine stopped.

July 19.—Admitted to hospital. Extremely nervous, with pounding heart.

July 22.—Basal metabolic rate plus 31, weight 87, pulse 132.

July 25.—Lugol's solution begun.

August 9.—Basal metabolic rate plus 15, weight 87, pulse 130.

August 26.—Basal metabolic rate plus 13, weight 91, pulse 132.

September 13.—Basal metabolic rate plus 17, weight 101, pulse 130.

September 18.—Lugol's solution stopped.

September 30.—Basal metabolic rate plus 17, weight 110, pulse 120.

October 6.—Basal metabolic rate plus 12, weight 112, pulse 120.

October 11.—Basal metabolic rate plus 12, weight 113, pulse 120.

October 17.—Basal metabolic rate plus 6, weight 113, pulse 116.

October 23.—Basal metabolic rate plus 9, weight 115, pulse 116.

October 26.—Pulse 86.

October 28.—Operation.

November 8.—Basal metabolic rate minus 1, weight 114, pulse 88.

It will be noted that following admission to hospital there was an immediate improvement in basal metabolic rate, which fell from plus 52 to plus 31, and that the pulse was rapid (132). Iodine was then administered, beginning with small doses and gradually increasing.

For the next two months the basal metabolic rate remained low (plus 15, plus 13, plus 17) and the weight increased (87 to 101) but there was no lowering of the pulse rate. The heart continued to pound forcibly in the chest, and for these cardiac reasons it was considered unwise to operate.

On September 18 all iodine was stopped. The basal metabolic rate continued to fall and the weight continued to rise, but it was not until the iodine had been discontinued for 6 weeks that there was a fall of the pulse rate to the eighties, and the operation was considered advisable.

On October 28, operation was carried out, and a permanent remission secured.

Pathologist's report.—Specimen consists of two lobes of thyroid gland with isthmus, measuring 4" x 2½" x ½". Colour pinkish brown to dark reddish blue. Encapsulated on one surface. On palpation are firm nodular areas in softer areas. C.S. of a pale yellowish brown colour due to lobules of this colour separated by strands of white fibrous tissue. In some areas the tissue is quite hæmorrhagic.

Microscopic.—1. Diminished colloid, increased vascularity, increase in size and number of f.c.t. bands.

2. Epithelial hyperplasia, columnar cells, ingrowths.

3. Large amounts of interacinar epithelial cells, with slight attempt at alveolar formation and colloid deposit.

4. Scarred areas with epithelial cells showing atrophy.

5. Lack of uniformity in cell picture. Many areas with large empty acini, single layer of hyperplastic epithelium; other areas of compact cellular masses with few acini, with tendency to lobulation and encapsulation.

Diagnosis.—Hyperplasia, with diffuse interacinar epithelial growth.

Summary.—This is a case of adolescent goitre in which iodine in substantial amounts (sodium iodide gr. v, b.i.d.) was taken by the patient without supervision for 6 months, resulting in a toxic state that persisted for three months in spite of hospital care and small doses of iodine, but which subsided in 6 weeks after the iodine had been withdrawn.

CASE 2

Male, aged 37, served in Air Force in war of 1914. Exophthalmic goitre with iodine toxicity (Fig. 3).

May 28, 1933.—The onset of the disease was in May, 1932, when a basal metabolic rate of plus 22 was noted by his physician, and iodine treatment begun. From May, 1932, to May, 1933, he had taken iodine in various doses, and during that period had also received radium treatment, 3,000 mgm. hours to the gland. The patient had a strong stubborn nature and throughout his illness was extremely difficult to manage, arguing endlessly with a series of doctors regarding his treatment and steadily refusing to consider operation. In September, 1933, a second basal metabolic rate had been recorded as plus 52.

In May, 1933, when first examined, there was a complete syndrome of Graves' disease, with exophthalmos, enlarged hard thyroid, thrill and bruit. He was sent to the country to rest in bed for 2 months on small doses of iodine.

On July 20.—Admitted to hospital.

July 21.—Basal metabolic rate plus 33, weight 162, pulse 84.

July 26.—Basal metabolic rate plus 23, weight 166, pulse 84.

The patient refused a local anæsthetic, and was operated upon on July 28 under avertin supplemented by endotracheal nitrous oxide and oxygen with a little ether. The anæsthetic was poorly tolerated and the operation was made difficult by scarrring due to the radium treatment. His condition was good for 48 hours when he died suddenly in an acute "thyroid storm".

Pathologist's report.—Specimen consists of thyroid gland, right and left lobe and isthmus. The right lobe is 7½ x 4 x 3 cm. and the left is 5 x 3½ x 2½ cm. The capsule is thin. Over one patchy area the colour is dark red. No nodulation. The cut surface is yellowish grey in colour. No cysts.

Diagnosis.—Heterotrophic adenoid goitre.

Summary.—This case of exophthalmic goitre in a patient who was hard to manage resulted in a fatality that was entirely unexpected. The pulse, weight, and basal metabolic rate were satisfactory at time of operation but the prolonged iodine saturation had failed to produce colloid storage in the gland.

CASE 3

Female, married, aged 45. Nodular goitre with iodine toxicity. (Fig. 4).

April 2, 1932.—This patient is known to have had a symptomless enlargement of the neck for ten years. One year before she came under observation her daughter had been operated upon for toxic goitre. Impressed by this event she began to take iodine, and had continued to take it in unknown quantities, without supervision by a doctor, for 12 months.

On examination there was a nodular goitre of moderate size, blood pressure 140/50. Pulse 88. There were no ocular signs. The patient had not passed the menopause. She was restless, nervous, weak and sweating, with palpitation of the heart and œdema of the feet and legs. Iodine medication was stopped, and the patient placed in bed with ice-cap to the precordium.

April 2, 1932.—Basal metabolic rate plus 88, weight 103, pulse 100.

April 6.—Basal metabolic rate plus 89, weight 102, pulse 100.

April 12.—Basal metabolic rate plus 76, weight 100, pulse 92.

April 16.—Basal metabolic rate plus 67, weight 100, pulse 88.

April 20.—Basal metabolic rate plus 75, weight 98, pulse 92.

April 23.—Basal metabolic rate plus 65, weight 100, pulse 88.

April 29.—Basal metabolic rate plus 63, weight 102, pulse 84.

There was a rapid fall in the basal metabolic rate but no gain in weight until four weeks had elapsed.

April 30.—Operation.

Pathologist's report.—Specimen consists of thyroid tissue which has been considerably cut up postoperatively. It appears to consist of two distinct lobules. The right-sided one is much larger than the left. The cut surface shows a pale homogeneous tissue. No hæmorrhage, no cyst, no fibrosis grossly.

Microscopic.—Sections show thyroid tissue composed of acini of moderate size and containing dense staining colloid. The tissue in the secretory phase is considerably in excess of normal. The lining cells are cuboidal and in some acini there is desquamation of epithelial cells which have become swollen and pale. In one section there is a small well circumscribed encapsulated adenomatous nodule composed of small closely packed acini containing little colloid with considerable increase of interacinar connective tissue. In the capsule there are several points of calcification.

Diagnosis.—Benign adenoma fetal type.

Summary.—This patient with nodular goitre of 10 years' duration, was approaching the menopause, and took iodine without supervision for a year. After withdrawal of iodine the basal metabolic rate fell 26% in four weeks, and a gain of one pound in weight was registered. It is assumed, but of course cannot be proved, that the iodine caused the toxicity.

SUMMARY

Attention is called to a few patients who have been treated for a long period with large doses of iodine, and who appear to have developed a toxic state as a consequence of this incorrect medication. There are three varieties of patients in whom "iodine thyrotoxicosis" seems to have been induced—adolescent goitre cases, exophthalmic goitre cases, and cases of nodular goitre. It cannot be conclusively proved that the iodine alone is responsible for the toxicity, but I am inclined to believe that it is, and that the well-known rules of therapeutic administration of this remedy cannot be violated with impunity or without penalty. Iodine should be strictly reserved for cases of diffuse goitre with toxicity, and should be given for 10 days in doses of 30 minims of the Liquor Iodii Compositus (Lugol's solution) each day, and immediate operation then considered.

If in the zigzag pattern of debate on the problem of iodine thyrotoxicosis I join with those who would believe in its existence and seriously warn against its dangers, this may possibly be the last time that this subject will have to be similarly considered. Warnings against the misuse of iodine will no longer be needed if more efficient safe preparations become available. The great stride forward in thyroid physiology that has been made in the discovery of thiouracil, and other substances, promises to give us a much better means of producing a pharmacological remission than that obtainable by iodine. The observations of the Mackenzies,[9] so ably forwarded by Astwood, threaten to curtail or end the iodine phase. If Astwood's theory[1] of the prevention of thyroxin formation by thiouracil becomes generally accepted, and it is steadily gaining support, iodine with its real or imagined dangers, and with its proved advantages will disappear, after serving well for many years and saving many lives.

It is a pleasure to acknowledge the kindness of Dr. E. M. Eberts, Dr. C. K. P. Henry, and Dr. Philip Rowe for permission to quote their opinions and make use of their material, and of the late Dr. L. J. Rhea and Dr. J. E. Pritchard for their study of the pathological material.

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RÉSUMÉ

Trois cas de thyrotoxicose par l'iode sont rapportés. La thérapeutique par l'iode doit être réservée aux cas de goîtres toxiques diffus et la dose ne doit pas dépasser 30 minimes de solution de Lugol par jour pendant dix jours, puis, l'opération doit être envisagée. L'avènement du thiouracil corrigera les erreurs dues à l'iode et amènera des rémissions plus durables. Les thyrotoxicoses par l'iode ont été surtout observées dans le goître des adolescents, dans le goître exophtalmique et dans le goître nodulaire. JEAN SAUCIER

THYRO-CARDIACS

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THERE seems, even at this late date, a woeful oversight in the recognition of degenerating adenomatous goitres as one of the most common etiological factors in so-called "heart disease", especially in the Great Lakes area. This oversight is not confined to recent graduates or general practitioners, but patients with this steadily progressive type of heart disease are being too often completely overlooked by cardiologists of international repute. Patients are constantly being seen who have been treated for years for "heart disease" who have a degenerating adenomatous goitre or a degenerating general adenomatosis as the sole cause of their heart condition. Frequently, the presence of a goitre seems to have been completely overlooked. More astonishing, however, is the fact that the patients may have an obvious adenomatous goitre, but its relation as the cause of the heart problem seems to have been entirely neglected. In addition, in spite of the anxiety on the part of the patient and the relatives as to whether or not the goitre could be a factor, patients have been assured, and often very abruptly so, that their goitre could not possibly contribute to their heart lesion. Too many of them are still being told "to forget about their goitre and not bother it till it bothers them." Much unnecessary long-standing invalidism would be entirely avoided if all adult patients with a palpable adenomatous goitre were advised to consult at once some one highly experienced in dealing with goitre.

Those of us engaged in "clinic" or "group practice" probably see more "problem" cases than the average practitioner or specialist, but the rôle of adenomatous goitres as a cause of "heart disease" has been so constantly harped on during the past twenty-five years that it should be the common knowledge of every member of the profession. They are no longer "problem cases". If an adult patient has, (1) a tachycardia, intermittent or constant; (2) occasional extra-systoles; (3) a fibrillating heart; at once determine whether or not he has a palpable or hidden goitre, because that is one of the most common causes of such a heart problem. If a patient with such a heart has an adenomatous goitre, do not be influenced by a basal rate or even the mean of several rates, because a so-called normal rate, much less a low rate, does not rule out the presence of degeneration within the gland. In fact a majority of the most seriously ill thyro-cardiacs have a low rate. They are what Plummer, Davidson, Lahey and others described years ago as chronic hyper-thyro-cardiacs, and it is in this group particularly that mortality in goitre surgery has been highest. Fortunately, in recent years with more care in preoperative preparation, select anæsthesia and multiple stage procedures the mortality rate even in these (neglected) patients has been reduced to almost nil.

It is unfortunate, however, that patients with adenomatous goitres should defer having operation until they develop toxicity much mor true thyro-cardiac condition. Literally, thousands of adults are still being treated for "nervous break-downs", "neurasthenia", "myocarditis", and even "tuberculosis" who have nothing more or less than an adenomatous goitre. We have recently seen a man 43 years of age about to be admitted to a sanatorium for tuberculosis because he had a cough, a shadow in the left apex (in the roentgenogram) and had

lost 43 lbs. He merely had a cystic adenomatous goitre with an intra-thoracic projection. A one-stage operative procedure under local anæsthesia, eight days in hospital, and three weeks of rest at home cleared up his condition, and he returned to his work and full earning capacity as a lithographer. He had, unfortunately, had fifteen years of semi-invalidism, and for eleven months had not been able to work at all because of extreme weakness, progressive weight loss, and "heart disease".

A married woman of 49 years had been sick for six years with "heart disease" or "myocarditis". For the previous two years she had been almost constantly in bed. Unfortunately, the cardiologist, a most eminent specialist, had in a moment of exasperation, professional braggadocia, or, I am afraid, plain ignorance of the rôle of adenomatous goitres as a cause of the so-called thyro-cardiac syndrome, assured the poor woman and her family that she could not live more than another six months. In spite of a badly fibrillating heart she stood a 1,500-mile train journey fairly well. Examination revealed an ordinary fibrillating heart and the presence of a large adenomatous goitre and every other typical textbook picture of a toxic adenomatous goitre. The patient, and even her husband, suspected the goitre as a cause of her "heart disease", but both were abruptly advised that the goitre could not possibly be a factor. On the eighth day after her long train journey, a bilateral subtotal thyroidectomy was done under local anæsthesia. The morning of the fourth postoperative day the patient was found in tears. She had awakened at 3 a.m. and suddenly realized that the "weight" which had been over her heart for years had gone. Excitedly she rang for her nurse to question her about it, but the latter could give her little satisfaction. The patient went off to sleep, and awakened to find the weight was still gone, and, just like a woman, broke into tears of joy and relief. The weight never returned. She became one of the most active women in Canada, in a type of work which made it necessary for her to drive a car constantly.

The thyro-cardiac syndrome is observed in patients with adenomatous goitres, mixed adenomata, and exophthalmic goitre, but not in patients with a purely exophthalmic goitre. The myocarditis of the thyro-cardiac is caused by long-standing toxicity probably averaging nineteen years as against the tachycardia of exophthalmic goitre, with an average duration of nine months' toxicity. The toxicity in the adenomatous goitre is due to a degenerative process within the gland, whereas the toxicity of exophthalmic goitre is caused by an overgrowth, a hyperplasia of thyroid tissue itself. The toxic phenomena observed in patients with a degenerating adenomatous goitre is an entity distinct from that seen in patients with a pure exophthalmic goitre. In many ways the symptoms are the same, but there are so many distinctive signs and symptoms that the observant and experienced man would have little trouble in stating that the patient has an adenomatous goitre or an exophthalmic goitre, even before actually palpating the gland. In addition, in the majority of instances the experienced man can by palpation of the gland alone determine that the gland is of the exophthalmic or the adenomatous type, and in addition readily recognize a fetal adenoma, cystic degeneration, calcareous deposit, and carcinomatous changes.

It is unnecessary to point out how extremely important it is that such changes within the gland should be determined, because on that and the associated symptoms depends the type of treatment to be recommended. The preoperative preparation, the duration of it, the advisability of a single or multiple-stage operative procedure, the operative risk, and the operative and postoperative sequelæ to be foreseen and to be prepared for, must all be accurately determined, and be the common knowledge of all directly concerned with the care of the patient. Only by such a comprehensive picture of the case and by thorough and accurate preoperative treatment and foresight can dangerous operative difficulties and postoperative complications be avoided and mortality be reduced to the minimum.

The size of the gland bears little, if any, relation to the severity of the thyro-cardiac disease, except of course in patients with gross enlargement of the gland, substernal, intrathoracic or retropharyngeal projections with pressure symptoms that tend directly to aggravate the heart. Many patients with "heart disease", usually diagnosed as chronic myocarditis, may have a very small adenoma in a lower pole deep in the neck that can be palpated only with the greatest of care, and by a medical attendant who daily is constantly examining

such cases. Removal of that degenerating adenoma will at once clear up the heart.

Some years ago the head of a great electrical corporation in New York State, presented himself for examination. He had been increasingly nervous and irritable for twenty years, so much so that three years previously, under pressure from older associates he had felt obliged to resign from his many directorates, and particularly as president and managing director of the great electrical power company which he had himself largely developed. He had a somewhat atypical, but definite thyro-cardiac condition. Palpation revealed a very small adenoma in the right lower pole of his thyroid. The condition was explained to him, and operation advised. Only then did he confess that he had been all over Europe and America in a search for health, and only the late C. H. Mayo, four years earlier, had advised thyroidectomy. He had a son-in-law, a prominent internist in Boston, who could not palpate the adenoma, and scoffed at the suggestion of any surgery.

The man went to Muskoka where he rested for some weeks. Some six weeks later he decided, in view of our assurance that the gland could be dealt with under local anæsthesia only, to have the operation. Thyroidectomy was performed. On exposure, the left side was found not to be enlarged. It was entirely normal, and, except for being carefully palpated for a hidden adenoma was not disturbed. The lower pole of the right lobe was slightly enlarged, was low in the neck, and well back. The adenoma was placed medially, and in the extreme lower pole of the gland. The gland was excised with the adenoma intact leaving about one-sixth of the normal gland. The incision was closed without drainage. The adenoma was almost completely degenerated, and measured 2 x 2.5 cm. only. On the third day his extra-systoles ceased. On the fifth day he stated that the "load over his heart was gone", and asked to be allowed to get up. He was permitted to get up, and left the hospital on the seventh day. On the tenth day he returned to Schenectady by train alone. He was sixty-eight years of age at the time. Three months later he was taking up his directorates again, and in less than one year was back directing his vast organization.

There is, I am firmly convinced, some toxic content thrown into the blood stream from degenerating adenomata that directly affects heart muscle, first evidenced by an occasional extra-systole, but by its constant and insidious toxic or stimulating effect leads to a chronic myocarditis or nerve block of some type characterized by fibrillation. The astounding fact to my mind is how soon after removal of the adenomata the burden on the heart seems to be lifted and the distress disappears. In most cases this is usually realized by patients and reported by them before they leave the hospital bed

Thyro-cardiac disease progresses from an intermittent tachycardia after exertion, excitement, or even a heavy meal, to the occasional extra-systoles, to persistent extra-systoles, finally to the truly fibrillating heart. It is a gradual development of many years' duration. In a small percentage of patients with long-standing thyro-cardiac disease months may elapse before the myocarditis clears up.

The treatment of thyro-cardiac disease is essentially surgical, sub-total thyroidectomy. Preoperative care consists of rest in bed, sedatives, a high caloric diet, an ice collar over the gland if it is a large gland, but no digitalis. If the patient has marked heat intolerance, tremor, weight loss and increasing nervousness, Lugol's solution should be tried, but its effect closely watched. The extremely toxic exophthalmic goitre can scarcely be given too much Lugol's solution, whereas a patient in the late toxic stages of the adenomatous type may not tolerate even small doses of it and their symptoms may be aggravated rather than be benefited. Lugol's solution rarely is of any value in patients of the chronic hypo-thyro-cardiac type, in other words low-grade toxic adenomatous goitres. On the other hand, we have seen many very large palpable adenomatous glands gradually regress and shrink away to one-third of their original size after the administration of 8 to 10 minims of Lugol's solution after each meal and at bed-time. In short, Lugol's should be administered during the preoperative resting stage to thyro-cardiacs, but its effect must be closely watched, and if not definitely helpful its use should be stopped.

As regards operative risk, almost 100% of thyro-cardiacs will stand a hemi- or bilateral sub-total thyroidectomy after adequate preoperative rest and preparation. A selected anæsthetic is imperative if 100% are to survive the operation. We feel very strongly that local anæsthetic (novocaine 1%), of infiltration

type, with sufficient preoperative sedation is the simplest of all anæsthetics, and is essential. We cannot subscribe to rectal anæsthesia, open ether, or gas, and much less to intra-tracheal anæsthesia. The cervical block type should not be employed, and indeed is entirely unnecessary.

As to postoperative care, patients are placed in a semi-sitting posture with the head well supported. Thyroid extract, gr. 4, is given by mouth the first and second day, then gr. 2 for a few days and thereafter gr. 1 for some weeks or months, depending on the basal metabolic rate. Intravenous glucose is not employed, and in fact we believe may overburden the heart of a bad thyro-cardiac and cause a fatality. Blood transfusion is practically never required. A small percentage of patients may require oxygen administration, preferably, we believe, through the use of the Boothby mask. Ordinary commercial oxygen is all that is necessary with this mask. The restlessness and sense of confinement engendered by the oxygen tent so often is avoided, and the expense is slight as compared with the use of the ordinary oxygen tent and its cumbersome paraphernalia. There is the occasional patient who may require digitalis for a few days postoperatively. Ice collar and ice bags are applied to the neck, and sedatives used freely if the patient is restless. As previously pointed out, most true thyro-cardiacs notice cardiac relief within a few days after operation. There are many patients, especially those in the fifth, sixth and seventh decades of life who have had a long-standing myocarditis who must rest and take extra care of themselves for many months.

Even the most desperate thyro-cardiac can and should be dealt with surgically. In nearly thirty years of dealing with large numbers of goitre patients we have turned down only four or five patients in the late stages of thyro-cardiac disease as too late for surgery. In two of these we were entirely wrong. One patient in delirium was taken back to Manitoulin Island in a straight-jacket bound on a stretcher. This was in March or April. His condition gradually improved, to such an extent that he helped harvest the crop in August and September, and later in the fall, unfortunately, contracted pneumonia. He survived the crisis, but then developed delirium again such as he had in the spring, and got out of bed and wandered out into the yard, and died as a result of exposure. The other patient, a tall gaunt old woman, lived three years after returning home, but as an almost complete invalid because of her heart. Both of these patients should have been dealt with surgically, and would probably have lived on for years and in comfort in so far as the heart was concerned. It is a constant source of surprise and wonderment to me how completely the heart does recover after thyroidectomy in patients with true thyro-cardiac disease.

The most logical treatment of thyro-cardiac disease is the prevention of it, simply by thyroidectomy before the heart is involved. Almost twenty-five years ago I suggested to the late Dr. Henry Plummer that I believed all patients with adenomatous goitres should have a sub-total thyroidectomy, whether or not they had any symptoms, as soon as they got their adult growth, from twenty-four years of age on. That great clinician looked at me, smiled in that quiet way he had, and said "I have been advising patients along those lines for ten years, providing they have been thoroughly checked physically, accurately diagnosed, given proper preoperative treatment, and above all else operated upon under selected anæsthesia, and by surgeons dealing with the condition daily." Since that time we have unhesitatingly advised all patients with an adenomatous goitre to have it removed as soon as they can conveniently arrange to have it done. It is over twenty years since we have had a death in a patient with a non-toxic or relatively early toxic adenomatous goitre, and some thousands of such cases have been dealt with. Only in the very late group IV toxic thyro-cardiacs and those with huge substernal projections and true intra-thoracic goitres is any mortality excusable, and even in these late cases the mortality should be almost nil. As in most so-called "surgical deaths", any excessive mortality rate after thyroidectomy should be considered as a "surgeon's death" rather than a surgical death; a result of ill-timed surgery, inadequate preoperative preparations, too much surgery, improper surgery or lack of thorough postoperative care.

CONCLUSIONS

1. One of the most common causes of so-called heart disease in the Great Lakes area is a degenerating adenomatous goitre.

2. The presence of an adenomatous goitre and its relation to the heart problem should be constantly in mind.

3. The size of the gland bears little relation to the severity of the thyro-cardiac disease.

4. The treatment of the thyro-cardiac is surgical as quickly as the patient's condition will permit it.

5. The age of miracles is not past. Truly miraculous cures are constantly seen after subtotal thyroidectomy in patients with late thyro-cardiac symptoms.

6. Practically 100% of the thyro-cardiacs can and should be dealt with surgically.

7. Thyro-cardiac disease, and, particularly, the relation of "goitre" as the etiological factor is still being too often completely overlooked.

8. The life-saving value of thyroidectomy in such patients, the simplicity of present-day thyroidectomy, and the almost complete absence of mortality in such patients should be the common knowledge of all members of the profession.

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SULFONAMIDE ANURIA

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THE use of the sulfonamides both as a prophylactic and as a therapeutic measure should be accompanied by the knowledge that the procedure itself entails some risk. This knowledge is frequently neglected by those responsible for the administration of these potentially dangerous drugs.

Two recent cases of sulfonamide anuria with recovery will be presented after some preliminary discussion.

CHEMICAL AND PHYSIOLOGICAL CONSIDERATIONS

It is a well-known fact that the sulfonamides are excreted by the kidneys. As the urine passes along the tubules water is absorbed, thus the concentration of the sulfonamide in the urine may be increased a hundredfold or more. This elementary fact is frequently overlooked in administering these drugs. It follows that the blood sulfonamide level is not an index of safety. There is no true relationship between the blood level of the sulfonamide and the patient's ability to tolerate the drug.

Jenson[7] points out that the sulfonamides and their acetyl derivatives are weak acids, and that they form soluble sodium salts within the physiological pH range. Such salt formation is greatly augmented by increasing the urinary pH, which at the same time results in greater dissociation of these drugs, and consequently in an increased solubility.

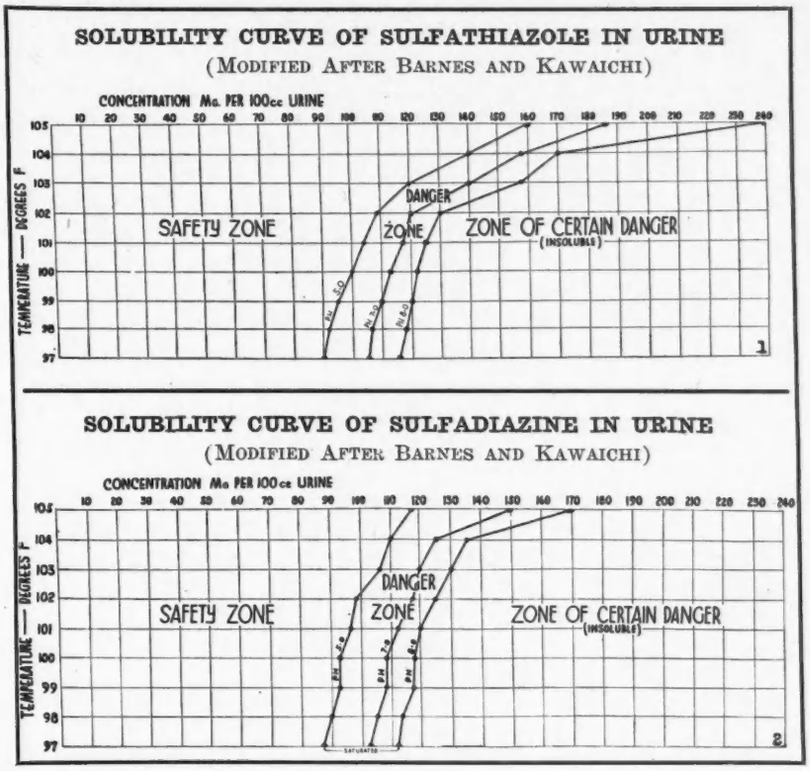
The factors which influence the deposition of crystals and concretions in the urinary tract are: (1) concentration of the drug in urine (which depends on blood level, renal function, and the volume of fluid passing through the kidney); (2) the degree of acetylation of the sulfonamide; (3) urinary stasis; (4) pH of the urine; and (5) temperature of the urine.[1] Clinically the concentration of the drug in the blood stream and in the urine can be controlled, as also can the pH of the urine. The degree of acetylation cannot be controlled. If the concentration in the urine is kept below the level of saturation for any given pH, there is little danger of crystalline forms settling out and causing obstruction. Solubility curves have been worked out by Barnes and Kawaichi[1] and solubility tables by Jenson and Fox.[7]

The important fact to remember is that the minimal solubility of these drugs in urine lies in the acid range; the solubility is greatly increased between pH of 7.0 and 7.5, and there is a further increase which Jenson and Fox[7] claim to be nearly tenfold at pH of 8.0. The indication for alkaline therapy with the sulfonamides would seem to be clear.

The toxic manifestations of sulfonamide therapy include dermatitis, conjunctivitis, anæmia, leukopenia, nausea and vomiting, pyrexia, disorientation, anorexia, dizziness, arthritic pains, acidosis, hæmaturia and anuria. Anuria from the use of sulfapyridine, sulfanilamide, sulfathiazole and sulfadiazine have all been reported.[1, 3, 4, 11, 14, 19] There are four separate renal lesions other than crystalline obstruction which sulfonamide therapy may cause; these are toxic glomerulonephritis, nephrosis, focal necrosis, and generalized swelling of the kidney with increased intrarenal pressure. These will be discussed under renal pathology.

It should be borne in mind that sensitivity may be developed to one particular sulfonamide or to the group as a whole. In the case reported by Ormond and Roth[14] a marked sensitivity to sulfathiazole developed when the patient was tolerating sulfadiazine without diffi-

culty. When sensitivity to the whole group exists, the reactions are usually prompt and violent but intolerance of one drug may develop gradually over a period of time. Toxic symptoms may even develop after the drug has been discontinued. A third case not reported in this paper developed gross hæmaturia 5 days after sulfathiazole had been discontinued.



Renal Pathology

Kasten,[8] in an excellent paper, discusses in detail the many possible causes of anuria. He divides them into four main groups: (1) circulatory, *e.g.*, embolism of main renal artery; low blood pressure in shock, etc.; (2) renal failure (excretory) due to extensive destruction of renal parenchyma; (3) obstruction to the outflow of urine, *e.g.*, blockage of ureters, etc.; and (4) mixed causes, in which he includes injuries to the kidney and ureter; war injury due to crushing; and burns.

In sulfonamide anuria one or more of five possible conditions may exist:

1. *Obstruction.*—This may be due to either crystals or blood clot and may occur in the ureters, the pelvis, or in the tubules. The obstruction is not always caused by crystals, frequently it is simply due to a blood clot in the ureter. When this is removed and the stagnant hydronephrosis drains, renal excretion returns if the damage to the kidney has not been too extensive. Case 1 is an example of this type.

2. *Glomerulo-nephritis.*—This is a true toxic glomerulo-nephritis, in which Bowman's capsule and the convoluted tubules become filled with a fibrinous exudate, which has not yet been identified.[5, 10] The number of glomeruli involved may be large or small.

3. *Nephrosis.*—Severe degenerative changes occur in the tubules. The lining cells of the convoluted tubules become swollen and filled with hyalin droplets. There may be a break in the tubular lining epithelium with the escape of hyaline material into the stroma of the kidney. If the process advances, fibroblastic invasion may occur, resulting in replacement fibrosis. Physiological function is lost.

4. *Focal necrosis.*—Areas of focal necrosis may appear in the kidney, in which all the elements undergo severe degeneration.

5. *Increased capillary permeability.*—This is followed by exudation into the renal parenchyma. Kasten[8] states that this may occur in circulo-excretory anuria; and that the raised intra-renal pressure obstructs the tubules and raises the urine pressure, thus opposing filtration and at the same time causing partial obstruction to the venous outflow, so that the kidney is congested with blood. It is on this theory that renal decapsulation to relieve the tension in the kidney is recommended. (This theory may be questioned on the grounds that if increased permeability did exist, the escape of proteins into the interstitial tissue could continue only until osmotic equilibrium was reached). Clinically however, such a condition does appear to occur. Case 2 is thought to belong to this group.

Treatment

It is important to remember that sulfonamide anuria can and should be prevented. This can be done by controlling the administration of sulfonamides, on the basis of the principles outlined under chemical and physiological considerations. The pH of the urine, the concentration of the drug in both the blood and the urine,

microscopic hæmaturia, and possible sensitivity to the drug should all be borne in mind when using this type of therapy.

When anuria does occur, treatment should follow a definite preconceived plan. If the drug has not been discontinued it must of course be stopped. Cystoscopy must then be done to exclude the existence of mechanical obstruction to the drainage of urine. The obstruction is frequently due to blood clot in the lower ureter, and when this is removed, a large catheter F No. 8 or 9 can usually be passed with relative ease to the renal pelvis. When the catheters are passed, the pelvis of each kidney should then be thoroughly lavaged to remove any crystals and small pieces of blood clot. Dilute sodium bicarbonate solution is preferred. The catheters should be left in place for 48 hours and irrigated every 15 minutes during this time to make certain that they remain patent. (If left in place longer than 48 hours œdema of the ureter is apt to occur). In many instances this treatment is sufficient to relieve the anuria. In both cases reported it was possible to catheterize only one ureter at the first sitting. Should this occur, it is advisable to repeat the attempt 12 hours later.

If mechanical obstruction of the ureters exist, and it is impossible to catheterize either of them, pyelotomy becomes imperative. If pylotomy or nephrostomy is done, the blood clot and debris can be removed at the time of the operation, and the pelvis lavaged frequently thereafter.

From here on, the treatment is variable, but still remains based on the principles already outlined. It is of the greatest assistance to appreciate the possible factors or combination of factors that may be at work in the kidneys. These are outlined under pathology.

Generally it is advisable to force fluids; 1,500 c.c. of 5% glucose in normal saline should be given intravenously twice a day. If at the end of 24 or 36 hours there is still no excretion of urine, then intravenous fluids should be discontinued to avoid œdema, and fluids given by mouth as tolerated. The blood non-protein nitrogen should be taken daily, and the blood pressure four times a day.

When anuria persists and uræmia develops, it is essential to do everything possible to eliminate the waste products. Four c.c. of magnesium sulphate 50% solution should be given intramuscularly twice a day, and 1 ounce of 50% magnesium sulphate orally three times a day. This achieves the twofold purpose of opening the bowels and eliminating as much of the waste products as possible, and of reducing cerebral œdema. At the end of 3 days of this type of treatment the patient will probably excrete some urine. The kidneys should again be flooded with hypertonic glucose solution, using 1,500 c.c. of 5% glucose in saline intravenously twice daily. If there is no response by this time, the kidneys are probably damaged to such an extent that the process is irreversible.

Diathermy to the kidney regions has been recommended by various authors. It is based on the premise that the tubules are obstructed by crystalline deposits of the sulfonamide. The solubility of the sulfonamides and the acetylated forms is known to be increased at elevated temperatures (see Figs. 1 and 2).

Renal decapsulation has been recommended by some writers. It is advocated on the theory that increased capillary permeability has led to exudation into the renal parenchyma, with marked increase of intrarenal pressure. Kasten,[8] however, in speaking of renal decapsulation makes the following statement:

> "It is believed that the added trauma of anæsthetic agents and other factors do more harm than good. The feeling is, that if the toxic or infectious process in the kidney is not too overwhelming and if the patient's natural vitality will stand the accompanying uræmic condition until the acute process subsides, the patient will have the best chance of recovery under medical management."

Reciprocal transfusions in which 1,000 c.c. of blood are removed at a time and replaced by 1,000 c.c. of blood from a donor have been reported by Slagle and Pons[16] in a case of anuria due to mercurial poisoning. "After period of uræmia, renal output had increased, but the blood chemistry still revealed considerable nitrogen retention". The patient finally died of an intracranial hæmorrhage. The authors state that the experiment was done because of its theoretical implications and because of its possible therapeutic value. Theoretically, however, it is unsound. In a patient weighing 70 kg. approximately 70% of that weight or 49 kg. is due to water, 80% of which is intracellular and 20% extracellular. If 1,000 c.c. of blood were removed and replaced with 1,000 c.c. of fresh blood from a donor the exchange would be 1/35 of the total waste products of the patient, or only 2.8% (disregarding whatever waste products the donor's blood would add). If the whole blood volume of 6,000 c.c. were replaced by fresh

blood, the exchange of waste products would still be only 17% of the total. It is realized that final conclusions cannot be made until further cases have been studied.

Case Reports

Case 1

D-46,870, E.R.C., aged 23. This patient was admitted to a civilian hospital December 6, 1943, in a semi-comatose condition one hour after a motorcycle accident. He was found to be drowsy, but could be aroused. Physical examination revealed multiple abrasions of the face and limbs. Crepitus was felt on movement of the left clavicle. There was no evidence of cerebrospinal fluid escaping from either the nose or the ears. The chest and abdomen were normal to examination. The blood pressure was 145/95. The reflexes were equal but sluggish. The pupils were equal in size. There was a positive Babinski bilaterally.

A lumbar puncture was done. The fluid was bloody. Cell count was 40 per high power field. Pandy strongly positive; total protein 250 mgm. per 100 c.c.

He was given six ounces of 50% magnesium sulphate per rectum every four hours. Micturition was involuntary. Two days after admission a radiograph of the skull showed a stellate fracture of the squamous portion of the left temporal bone. A radiograph of the left clavicle showed comminuted fractures dividing the clavicle into three pieces.

Six days after admission the patient developed a serosanguinous discharge from the left ear, which later became purulent. He was placed on sulfadiazine therapy, receiving a total of 32 grams in 10 days. At the end of this time the blood sulfadiazine level was 6.1 mgm. %. He was transferred to another hospital, where he received 40.5 gm. of sulfadiazine during the following 3 days, and 28 gm. of sulfathiazole during the next 3 days. The 24-hour urinary output suddenly dropped from 2,000 c.c. to 270 c.c. on the 21st day of sulfonamide therapy. The sulfathiazole was promptly discontinued. The following day the 24-hour urine output dropped to 60 c.c. It was grossly bloody. The blood sulfadiazine level at this time was 3.3 mgm. %. The following day he did not void at all and the bladder was empty when catheterized.

A urological consultation was requested after two and one-half days of anuria. He was seen by Surgeon Commander H. S. Morton. At this time the patient was irrational, with a dry furry tongue and rolling eyes. There was tenderness in the abdomen most marked in the hypogastrium and left costovertebral angle. A diagnosis of sulfonamide anuria was made, and cystoscopy performed (H.S.M.) under local anæsthetic. The lower end of each ureter stood out prominently on the bladder floor, appearing as a ridge on each side raising up the mucous membrane. Each orifice was obstructed with a protruding blood clot. After several attempts, the plug in the right ureteral orifice was removed and a F No. 8 ureteral catheter passed with ease. Lavage of the right renal pelvis was carried out and the catheter was left in place. No crystals were found in the washings. Repeated attempts to pass a catheter up the left side were unsuccessful. During the next 12 hours the catheter in the right ureter drained 2,000 c.c. of urine. It was then removed, and cystoscopy repeated (J.T.M.). This time it was possible to remove the "plug" from the left ureteral orifice and pass a F No. 9 ureteral catheter to the renal pelvis. Lavage of the pelvis was carried out, and the catheter was left in place for 24 hours, during which period the total urinary output was 5,000 c.c. The blood non-protein nitrogen promptly dropped from 180 mgm. % on December 28, 1943, to 34 mgm. % on January 1, 1944. Recovery thereafter was uneventful. He was discharged from the hospital on the forty-sixth day after admission.

This patient had 32 gm. of sulfadiazine in the first 10 days of therapy and 68 gm. of sulfonamides during the next 6 days. It can be said with certainty that 10 gm. daily is too large a dose to be given any patient. It is also felt that sulfonamides should not be given continuously without a rest period of 7 to 10 days. The interesting feature in this case is that both ureters were obstructed in their lower portions by blood clot. When the clot was removed on each side, the ureters could readily be catheterized. Drainage thereafter was normal. It is not an unusual experience to find that the blood clot alone is responsible for the obstruction; that is why it is imperative to do a cystoscopy in all cases of sulfonamide anuria.

Case 2

V-32,829, aged 21. This patient had been under treatment for an acute specific urethritis since December 24, 1943. Sulfonamide therapy had been administered as follows: sulfathiazole 74 gm. in a period of 21 days, followed by another course of sulfathiazole totalling 65 gm. in 10 days, followed by a course of sulfapyridine totalling 15 gm. in 4 days. A rest period of 2 days was given and then 55 gm. of sulfadiazine were administered during the next 11 days. The urethritis persisted, and it was decided to discontinue treatment. One week later, upon the advice of a consultant, sulfadiazine was again given, this time 10 gm. a day. After 3 days the patient complained of generalized abdominal pain. The output of urine suddenly dropped to 200 c.c. in the next 24 hours, and became grossly bloody. The patient was admitted to a hospital, where 1,500 c.c. of 5% glucose in distilled water was given intravenously and sodium bicarbonate was given by mouth. The following day he voided 960 c.c. of urine. It is not known if this was bloody. The blood pressure at this time was 158/100.

There then followed a period of 5 days during which the patient did not void at all. On the fourth day of anuria 240 c.c. of thick bloody urine were obtained by catheterization. The blood non-protein nitrogen was 90 mgm. %. On the fifth day of anuria, February 29, 1944, he was admitted to the Royal Canadian Naval Hospital, Esquimalt.

On admission, the patient was fully conscious and co-operative. He complained of discomfort in both costo-vertebral angles. Physical examination was essentially normal except for the tenderness in each costo-vertebral angle. The right kidney was considerably enlarged and readily palpable, the left kidney was not palpable. The blood pressure was 170/110.

Cystoscopy was performed under local anæsthesia. Four ounces of very thick bloody urine were obtained from the bladder. After the bladder had been thoroughly washed out, the distended lower end of each ureter could be seen running across the floor in a marked ridge. Each ureteral orifice showed marked bullous œdema, and a blood clot protruded from each orifice. It was possible to dislodge the blood clot on the right side and pass a F No. 8 ureteral catheter to the renal pelvis. Repeated attempts to dislodge the blood clot from the left ureteral orifice were unsuccessful. Washings from the right renal plevis were examined for crystals but none were found. The catheter was left in place, and the patient given 1,500 c.c. of 5% glucose intravenously. About 60 c.c. of bloody urine drained from this catheter during the next 12 hours. Cystoscopy was repeated, again under local anæsthesia. By using a flexible corkscrew stone dislodger and biopsy forceps it was possible to cut the plug out of the terminal portion of the ureter and remove it as one would "core" an apple. An F No. 9 ureteral catheter was then passed with ease to the renal pelvis. Ninety c.c. of fluid was obtained at once, and the flow of urine continued for 3 hours, when it abruptly ceased. The blood non-protein nitrogen at this time was 109 mgm. %.

The patient was given 1,500 c.c. of 5% glucose in saline intravenously twice a day. Only a few c.c. of

very bloody urine were obtained from each catheter in a period of 24 hours. The catheters were withdrawn at the end of 48 hours, intravenous fluids discontinued, and fluids given by mouth as tolerated. The patient became distended and vomited several times, his temperature rising to 101°. Four c.c. of 50% magnesium sulphate were given intramuscularly twice a day, and 30 c.c. by mouth 3 times a day. His blood pressure remained constant at 170/110.

On the fourth day after admission (8th day of anuria) 3 ounces of thick bloody urine were obtained. His face had become puffy, but there was no peripheral œdema. The blood non-protein nitrogen had risen to 150 mgm. % and the patient was vomiting. He took 1,500 c.c. of fluid by mouth this day, and the following morning 360 c.c. of bloody urine was obtained by catheterization.

Intravenous glucose therapy was started again. One hour after receiving 1,500 c.c. of 5% glucose in saline he voided 660 c.c. of urine. During the next 24 hours he voided 9,000 c.c. of urine, 8,000 the following day, and 6,000 c.c. the next day. During the following week his blood non-protein nitrogen dropped to 30 mgm. % and his blood pressure to 120/70. Eight days after admission he excreted only 9% phenolsulphonphthalein in 2 hours. One week later he excreted 37% of phenolsulphonphthalein dye in 2 hours. The urine at this time still showed a few red blood cells, many pus cells, hyaline casts, granular casts and mixed pus casts. Diplococci were present in stained smears. The fundi were normal to examination. The blood proteins were 6.4 gm. and the blood chlorides 462 mgm. %.

This case probably represents a combination of three or more of the pathological possibilities. The patient had a definite mechanical obstruction at the lower end of each ureter. When this was removed there was still no appreciable excretion of urine. He had an enlarged palpable right kidney which may possibly be explained on the theory of increased permeability of the capillaries with extravasation into the interstitial tissue. The resultant increased intrarenal pressure may have been a factor in the excretory failure of the right kidney. That he still had at the end of 15 days, both glomerular and tubular damage seems certain from the urinary findings, and the low excretion of phenolsulphonphthalein. How much function will return is doubtful, but it may improve considerably.

Intravenous pyelograms have not been done. In the acute stage it was deemed inadvisable, for if any sensitivity to iodine had existed the patient might not have survived the procedure. Retrograde pyelograms were not made at the time the ureteral catheters were *in situ*, because of the grave condition of the patient.

CONCLUSIONS

1. Two recent cases of sulfonamide anuria with recovery are presented.

2. The chemical and physiological considerations which should be borne in mind when using sulfonamide therapy are reviewed.

3. Alkalies given with the sulfonamides greatly increase the solubility of the sulfonamides in the urine.

4. Toxic symptoms from the administration of sulfonamides may not appear until several days after the drug has been discontinued.

5. The determination of the sulfonamide concentration in the urine and the pH of the urine is of more value than the blood level, in the prevention of renal complications from sulfonamide therapy.

6. Sulfonamide anuria may be due to either mechanical obstruction or to the toxic action of the drugs on the kidneys. Mechanical obstruction may be due to either blood clot or crystals. The obstruction may be in the ureters or in the kidney tubules. The toxic renal lesions which can be produced by sulfonamides are, glomerulonephritis, nephrosis, focal necrosis, and generalized swelling of the kidney with increased intrarenal pressure.

7. A definite procedure to be followed in the treatment of sulfonamide anuria is proposed. It is considered that cystoscopy is essential in all cases. If obstruction is present in the ureters, attempts should be made to relieve it by catheterization. If this fails, pyelotomy or nephrostomy is indicated.

The writer wishes to thank Surgeon Commander H. S. Morton, Surgeon-Lieutenant Commander D. M. Whitelaw, and Surgeon-Lieutenant Commander J. Calder for the helpful suggestions which they have made.

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A PRACTICAL METHOD FOR THE SUPPLY OF FRESH MILK TO ISOLATED R.C.A.F. STATIONS

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THE ration used by the Royal Canadian Air Force consists essentially of the following foods: meat 12 oz.; bacon 2 oz.; eggs, 6 to 9 per week may be used in lieu of some of the bacon and some of the meat; potatoes 12 oz.; vegetables 8 oz.; bread 12 oz.; milk 20 oz.; butter 1½ oz.; cheese ⅜ oz.; fruits or fruit juices 5 oz.; sugar 1¾ oz.; jam 2 oz.; cereals 1½ oz.; rice 1 oz.; peas or beans 1 oz.; tea, coffee, salt, pepper, vinegar, salad oil, and various spices. Many alternatives are available in each class of foods.

Assays of these rations as served at more than 100 R.C.A.F. stations show the great importance of milk as a source of many of the essential food nutrients. The 20 oz. of milk supplies approximately 12% of all of the calories, 15% of the protein, 15% of the fat, 20% of the vitamin A, 50% of the riboflavin and 60% of the calcium. In addition to the high nutritional value of the milk, it is important in the preparation of many palatable and attractive dishes. Also milk is a favourite beverage for most young Canadians and when it is not available for drinking purposes, complaints are invariably received.

Many R.C.A.F. stations are situated at isolated spots. At these places no fresh milk is available and the difficulties of transportation by either water or air are such as to make the regular delivery of fresh milk impractical. Accordingly, a study was made by the Medical Branch of the R.C.A.F. to develop a practical method of supplying an acceptable whole milk for both beverage and cooking purposes.

Gas-packed whole milk powder is made from fresh whole milk which is dried to remove the water, and the resultant powder is gas-packed in tins. The powder consists simply of fresh whole milk with the water removed. Gas-packed whole milk powder if unopened will keep for many months. No transportation difficulties are involved with this product. An investigation was made of the nutritional value of this milk when reliquefied to the concentration of fresh whole milk and the results compared with fresh milk as obtained in the open market in Toronto in October, 1942. The finding set out in Table I show that the values of the vitamins

TABLE I.

VITAMIN ASSAY OF RELIQUEFIED WHOLE MILK POWDER AND FRESH MILK

	Carotene Int. units per 100 c.c.	*Vitamin A Int. units per 100 c.c.*	*Thiamin gamma per 100 c.c.*	*Riboflavin gamma per 100 c.c.*
Reliquefied milk from whole miik powder.....	78	54	33	212
Fresh pasteurized milk. Toronto, Oct. 31, 1942....	78	43	37	191

assayed are approximately as high, and in some instances higher, in the reconstituted milk, than the values found in October fresh milk. The specifications for whole milk powder for use in R.C.A.F. stations state that it must contain 28% fat. In order to reconstitute the powder, one pound of the powder is dissolved in water and brought to a total weight of eight pounds. Thus the fat content of the reliquefied milk would be ⅛th of 28%, or 3.5%. In regard to fresh milk, in most parts of Canada 3.25% is the minimum legal amount of fat. It can be stated that generally fresh milk as purchased in Canada runs above the legal minimum content of fat, and usually approximates 3.5%. It would appear that from the nutritional standpoint reconstituted milk from whole milk powder is equal to fresh milk.

However adequate reconstituted milk might be from a nutritional standpoint, it would be valueless unless its taste were acceptable. The usual complaint concerning freshly reconstituted powdered milk is that it has a somewhat chalky, powdery taste. Such a product would not be acceptable for drinking purposes. It was found, however, that if the milk powder were thoroughly mixed, strained to remove any undissolved powder and *aged for 24 hours in a refrigerator,* the objectionable taste was overcome. The fluid milk resulting from this process closely approximates in flavour ordinary fresh milk. It was found that ageing in the refrigerator for 24 hours was essential to the development of this flavour. Ageing for another 12 to 24 hours still further improved the taste

Fig. 1.—Typical R.C.A.F. dairy building. **Fig. 2.**—Room for washing and steam-sterilizing milk cans. **Fig. 3.**—Middle room of dairy building for the reconstitution of whole milk from whole milk powder. **Fig. 4.**—Electrical mixer for thoroughly mixing milk powder. **Fig. 5.**—Walk-in refrigerator where the reconstituted whole milk is stored and aged for 24 hours. **Fig. 6.**—Wash tank and boiler. **Fig. 7.**—Mobile milk unit. **Fig. 8.**—Equipment of mobile milk unit.

of the product, but the degree of improvement was not such as to justify the extra refrigeration and milk cans required.

In order to determine the acceptability of the product, milk was reconstituted on three isolated stations where fresh milk was not available, and served to between 500 and 1,000 R.C.A.F. personnel; 97% of the men and women questioned stated that they would drink this milk if it were available.

Accordingly, dairy buildings for the reconstitution of fluid milk in large quantities on isolated units were designed and built. (Fig. 1). The buildings consist of 3 rooms. In one room the milk cans are washed and steam-sterilized (Fig. 2). In the second room (Fig. 3) the milk powder is reconstituted in 8-gallon cans by means of a small electrical mixer (Fig. 4). The third room consists of a walk-in refrigerator, wherein the reconstituted milk is stored during the ageing period (Fig. 5). R.C.A.F. personnel have been trained in the proper methods of milk preparation and in the care required to produce a safe product. These dairymen function directly under the Senior Medical Officer on each unit, who is responsible for the bacteriological control of the milk. The milk is reconstituted each morning and is delivered to the various messes 24 hours later. It is stored in the mess-hall refrigerator and served ice-cold. In 15 large isolated R.C.A.F. stations these dairy buildings are in operation. The milk has been

well received and in some units as much as 24 oz. per man per day is consumed.

In small isolated R.C.A.F. detachments of under 100 men, milk cans and milk powder are provided. The fluid milk is reconstituted by a manually operated wire whip and strained and aged in the refrigerator in the manner outlined above.

At the present time approximately one million pounds of powdered milk per year is used in this manner in the R.C.A.F. It is felt that this milk is an important factor in maintaining the health and morale of R.C.A.F. personnel in isolated units.

For use overseas the Construction and Engineering Division of the R.C.A.F. has designed and constructed a mobile milk unit. (Fig. 7). This unit, which is on a trailer, consists of an electrical generating plant at the front. Back of this is a refrigerator capable of holding 20 eight-gallon milk cans. There are at the back of the trailer two mixers, a sink for washing the cans, a water tank, and the necessary apparatus for generating the hot water and steam for sterilizing the cans (Figs. 6 and 8). All apparatus is run by electricity generated by the power plant on the unit. As long as there is a supply of milk powder and water, the unit can operate anywhere. Its capacity is 1,280 pints of milk a day. If additional local refrigeration is available, the capacity is about three times this amount. A number of these mobile milk units are in process of construction.

SUMMARY

A practical method of supplying fluid milk for drinking purposes to R.C.A.F. personnel in isolated stations has been devised. This consists in the use of gas-packed powdered whole milk, its thorough reconstitution by means of an electrical mixer, straining, and ageing in a refrigerator for 24 hours before serving ice cold.

The authors desire to express their appreciation to the Borden Company, Limited, for their help in many of the practical problems encountered in this work.

RÉSUMÉ

On a imaginé un procédé simple et pratique pour assurer aux postes isolés de la R.C.A.F. une provision adéquate de lait buvable. Celui-ci est desséché puis mis en boîtes scellées après y avoir fait le vide. On utilisera de nouveau ce lait en y ajoutant de l'eau, en le faisant couler à travers une passoire et en le gardant 24 heures dans un réfrigérateur. Servi alors très froid, il a conservé ses propriétés nutritives et il est excellent au goût.

JEAN SAUCIER

EXTERNAL FIXATION IN FRACTURES

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IT will be my purpose in this short communication to describe the use of the Stader splint at Camp Borden Military Hospital, and to give my impressions of the results obtained. There was a total of 28 cases.

A new procedure, or the re-adoption of an old procedure in surgery has always met with criticism, and this is very much the case in the most recent use of such apparatus as the Roger Anderson, Haynes, Stader and other mechanical aids for the reduction and fixation of fractures. Such criticism has been due to poor results and even catastrophes, in the hands of some. Many surgeons do not hesitate to plate a recent fracture, either compound or simple, and will accept the results as satisfactory even when non-union results or sinuses develop, but are loath to overlook a mild "pin seepage" in a case where satisfactory union in good position has been obtained by the use of pin fixation.

Like all mechanical appliances, skeletal fixation must be studied and used intelligently to obtain satisfactory results. I do not wish to create the impression that the busy doctor in a small town with inadequate operating room assistance should attempt to use this method. However, I believe that it has a place in the modern hospital when used by men who will take the trouble to study it and use it intelligently. It will either be discarded and placed in the basement cupboard, or be used occasionally by the tyro with questionable results, unless some keen surgeon becomes responsible.

At Camp Borden Military Hospital under the stimulation of the interest shown by Colonel Harris, I have had the opportunity with members of my surgical staff of using the Stader splint over a period of approximately ten months. Before we received the apparatus, all surgeons to whom its use was entrusted spent a week in Toronto, learning about it and applying it to the cadaver. This experience was invaluable and was, I believe, the prime factor in ensuring the results we have obtained. The splint has been used in both recent and old fractures, simple and compound, and in reconstruction surgery. There have been no fatalities, nor has there been any infection; union has been ob-

tained in all cases, save one (Case 4) in the minimum of time; joint and muscle function has been infinitely better than was formerly obtained by other methods; and the patient's comfort has been greatly increased.

As the surgical staff has become more expert in the use of the Stader splint, fractures are handled with greater ease. A simple fracture of the tibia and fibula has been treated by the application of a splint in seven minutes, under pentothal anæsthesia. This is the procedure followed:

The fracture is first reduced manually after the skin has been prepared with iodine and draped. An orderly in sterile gloves and gown maintains reduction and holds the foot. The leg is supported on a pillow. On the superficial antero-mesial surface of the tibia, the site is selected for the top and bottom pin hole, a finger-breadth from the joint line. The splint is then fitted to the leg in the approximate position in which it will lie. The top pin is drilled through both cortices by the surgeon holding the pistol-grip drill, while an assistant turns the cable-driven hand motor. The bakelite block is held by the surgeon's left hand, approximately a finger-breadth from the skin. The second pin is placed through the bakelite block and drilled home in a similar manner. The block is then locked in place by set screws. When this is done, the lowermost pin, close to the ankle, is drilled through the lower hole in the bakelite block and the pin is inserted through the top hole in this block, and drilled. Both bakelite blocks should be in line. The pins are then locked in the lower block by turning the set-screws, and with all bolts and adjusting screws loose, the connecting bar is placed between the two bakelite blocks, and all nuts and adjusting screws are tightened to finger pressure and then locked tight.

The fracture is now considered to have been reduced and immobilized, and x-ray plates are taken parallel to, and at right-angles to, the pins. After scrutiny of these plates, any minor adjustments can be made, and the fracture ends are impacted with a few turns of the turnbuckle.

At the end of ten days and again at the end of twenty days, further impaction should be done. This is very important, as some absorption takes place between the ends of the bone fragments.

"Pin seepage" has been a minor factor in two of our cases, and "ring sequestra" in one case. It is felt that the heat created by the original Stader pins was the cause. Drilling hard cortical bone was difficult and undoubtedly created a great deal of heat. In the pins recently designed by Dr. Stader and Colonel Harris, the heat factor has been entirely eliminated. These pins were used in our most recent cases, and one could note the great ease with which the pins were inserted. We have been careful to use aseptic technique and to place the pins close to the joint above and below the fracture and through both cortices.

The following case histories are presented:

CASE 1 (FIG. 1)

L.A.C. J.B.C., R.A.F., aged 22.

July 25, 1942.—Airplane crash. Compound fracture, right radius. Debridement with replacement of fragment 2½" long, in lower third. Good result. Considerable muscle destroyed on extensor surface of forearm.

July 31.—Thick foul pus.

October 9.—Traction by Kirschener wire through thumb to prevent drift and shortening of radius.

June 10, 1943.—Sequestrum removed.

September 30.—Stader splint and bone-graft from tibia. Lower half-pin unit put through metacarpals and upper in upper radius. Used radial splint extended by joining it to a half-calcaneal splint, the ends of the two bars butting against each other in the block of the calcaneal splint. Distracted and locked. Bone-graft from tibia placed in bed in radius involucrum and upper end held by two fine stainless-steel wires. No sulfathiazole.

October 26.—Healed by first intention. X-ray shows graft in good position. Highest temperature 100.3°. Was given soludagenan intravenously. Still in splint.

January 14, 1944.—X-ray shows a bony bridge extending between the two main fragments and decalcification of the graft. Graft appears well-united at both ends. Splint still on. No reaction about pins.

February 3.—X-ray shows union along graft between both fragments. Stader splint removed. Physiotherapy. Union, 4 months.

March 29.—Flexor carpi radialis inserted into flexor longus pollicis.

May 3.—Returned to R.A.F.

June 3.—Back as pilot.

CASE 2 (FIG. 2)

L.A.C. J.R.R., R.C.A.F., aged 22.

June 23, 1943.—Simple fracture, left humerus, mid-shaft, transverse.

June 24.—A Kirschener wire was put down through greater tuberosity and guided past fracture line. Wire removed. Cast applied. X-ray shows fracture line still visible.

October 20.—Stader splint applied with lower quadrant and pins inserted through the triceps. This was done to give more adequate immobilization as it was felt that union was being delayed (4 months).

December 19.—Union firm (2 months). Discharged to R.C.A.F.

CASE 3 (FIG. 3)

Sgt. R.P., R.C.O.C., aged 34.

June 18, 1943.—Hit by motorcycle in Barrie, sustaining compound comminuted fracture of left tibia and fibula; also compound dislocation of right index finger. Unconscious.

June 18.—Operation: Debridement with reduction (manual) and packing. Plaster cast. Transfusion and soludagenan.

August 3.—Cast changed; pack removed; charcoal cloth in plaster cast.

August 24.—Wheel chair; crutches.

September 30.—Cast off; wounds healed. X-ray shows no union; ¾" shortening.

November 24.—Sliding bone graft after application of Stader splint. Lower half-pin unit arc with pins at right-angles. Splint placed on lateral aspect of leg. Graft held at upper end by stainless-steel wire and wedged into lower fragment. Soludagenan. X-ray shows good position. No impaction made on account of danger of loosening graft.

January 12, 1944.—Graft in same site; position excellent.

February 26.—Splint off. Union firm, 3 months. Physiotherapy.

CASE 4 (FIG. 4)

Tpr. M.K.W., T.E., aged 19.

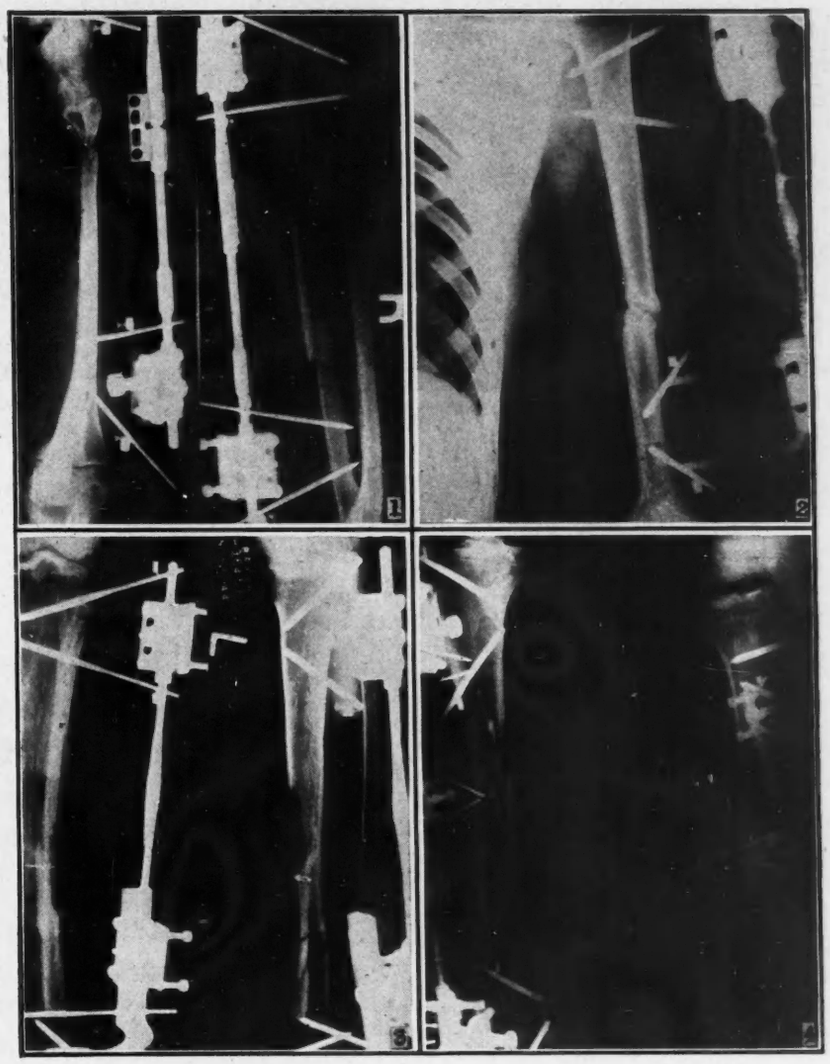
January 21, 1944.—Ran into a truck on motorcycle. Badly comminuted compound fracture, right tibia and fibula, both midshaft. Two loose fragments and a large "butterfly". Kirschener wire through os calcis and 15 lb. extension.

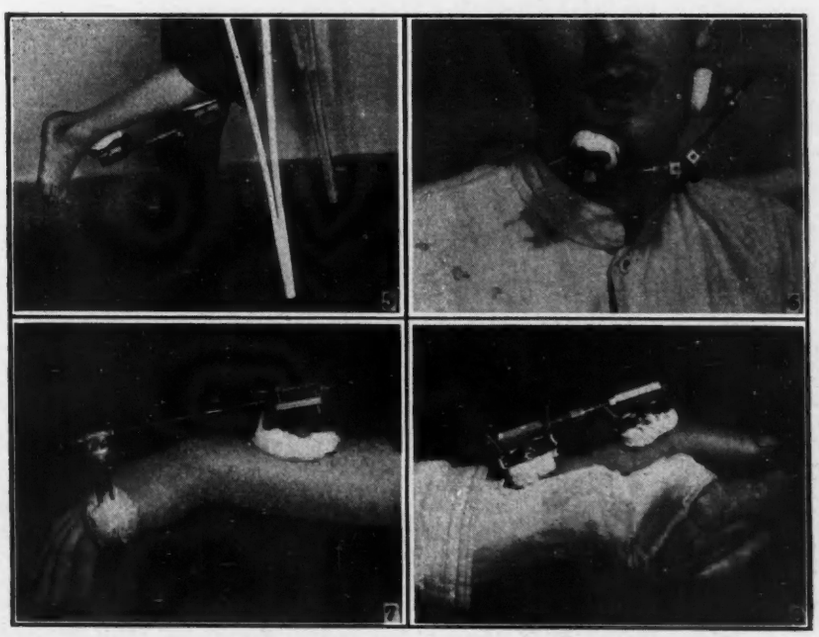
January 22.—Stader splint with straight half-pin unit, top and bottom, on antero-mesial surface. Two loose fragments removed. Wounds closed after inserting sulfathiazole gm. iii.

February 2.—X-ray shows fragment in fairly satisfactory position.

March 1.—"Butterfly" fragment fixed to upper main fragment by clavicular splint.

February 21.—Cast for foot-drop which is probably due to hæmorrhage.





April 12.—Small Stader splint removed. "Butterfly" fragment united to upper shaft.

May 29.—Stader splint removed; both upper pins loose. Cast, toes to groin.

June 16.—"Butterfly" not united to lower main fragment. Stader splint re-applied with four new pins and bone graft from other leg inserted.

June 30.—Wounds clean—no fever—up on crutches.

July 26.—Stader splint removed and cast applied. Union has taken place.

CASE 5 (FIG. 5)

Pte. M.W., C.I.T.C., aged 27.

January 26, 1944.—Stepped into a hole while running on night manœuvres. X-ray shows transverse fracture of mid-shaft of right tibia. Fibula intact.

January 27.—Tibial Stader splint applied to antero-mesial border. Straight half-pin units top and bottom.

January 29.—Impacted.

February 3.—Slight posterior bend at fracture due to impaction.
February 4.—Bend corrected.
March 23.—Union—walking cast.
April 14.—Cast off—under 3 months.

CASE 6 (FIG. 6)

Tpr. J.R.F., T.E., aged 23.
January 28, 1944—Crushed between two tanks, sustaining compound comminuted fracture of mandible and compound comminuted fracture of upper humerus and radius and ulna, right. Circulation and nerves destroyed. Arm amputated. Plasma and transfusion. S.W. gut suture through tongue. Fragments of lower jaw in midline, together with teeth, removed from floor of mouth. Lacerations of mucous membrane and skin closed after inserting sulfathiazole. Wires placed around two lower and two upper teeth for future use.

February 2.—Stader splint made of two jaw splints combined. One half-pin unit placed just in front of left angle; second unit placed just to right of symphysis. Capt. Fahey, C.D.C., adjusted occlusion and splint locked. Fracture in right ascending ramus, just above coronoid process, may be held by pull of pterygoids.

February 3.—X-ray shows that right fragment needs to be moved to the right and elevated to allow long marginal tongue of this fragment, which projects to the left, to come into proper position.

February 6.—Adjusted. X-ray satisfactory.

March 27.—Stader splint removed; union in 2 months.

CASE 7 (FIG. 7)

Lieut. K.D.W., G.A., aged 22.
February 4, 1944—Colles' fracture sustained by a fall. Comminuted.

February 4.—Stader splint applied to mid-shaft of radius with Kirschener wire through metacarpals and stirrup. Fracture reduced and checked with fluoroscope and plates.

February 8.—Further manipulation satisfactory, but still posterior rotation although length restored.

February 18.—Position adjusted.

March 14.—Splint off.

April 27.—Full duty.

CASE 8 (FIG. 8)

Pte. J.W.M., T.C., aged 27.
February 7, 1944.—Hit on thumb by hockey stick. Bennett's fracture without displacement.
February 8.—Stader splint from radius to 1st metacarpal. Position excellent.
March 7.—Splint off. Union, 1 month.

SUMMARY

The Stader splint has been used in 28 fractures, as follows: femur 3, humerus 2, radius 2, Colles' 1, Bennett's 2, tibia and fibula 16, mandible 2.

Union was obtained in all cases save one without complications, the time being for one femur, two months; one femur, four months; eleven tibias, twelve weeks.

CONCLUSIONS

1. External pin fixation of fractures is an excellent means of obtaining early union in good position.
2. In reconstruction surgery it is extremely valuable.
3. It can be used without danger of gangrene from pressure due to hæmorrhage.
4. Certain principles are laid down.

NOTE: Since this paper was submitted for publication, an additional 18 cases have been treated by this method.

We acknowledge our indebtedness to the work of Shaar and Kreuz. Their book is invaluable.

For the technical perfection of the photographs here shown, I sincerely thank Captain Morris and Sgt. Ryan of the Canadian Armoured Corps in Camp Borden.

ALTERATION FROM NORMAL TO ABNORMAL P-R INTERVAL WITH CHANGE IN POSTURE

By Squadron-Leader G. W. Manning and Wing-Commander C. B. Stewart, R.C.A.F.

Toronto

DURING a study of the routine electrocardiograms of R.C.A.F. aircrew in 1940 and 1941, four cases were discovered which showed a marked alteration in P-R interval with change in posture. Changes in the direction and amplitude of the wave complexes as a result of change in posture have frequently been reported. Slight alterations are also known to occur in the time intervals with change in heart rate. However, a review of the literature has failed to reveal any previous report of change in the P-R inter-

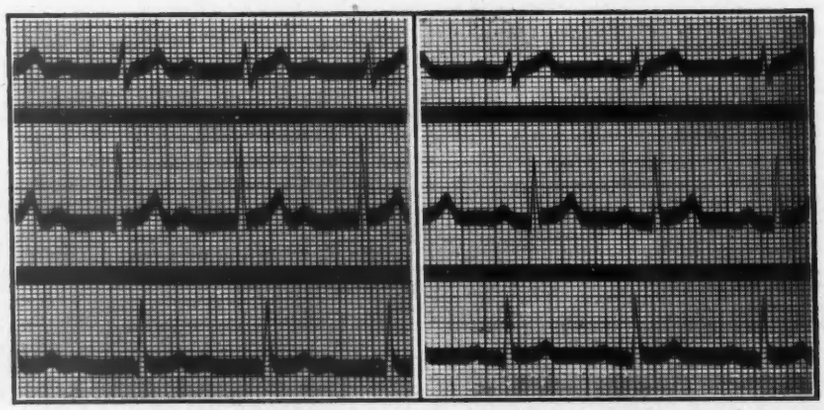


Fig. 1 Fig. 2

Fig. 1. Case 4, 1940.—Recumbent. Prolonged P-R interval.
Fig. 2. Case 4, 1940.—Sitting. Normal P-R interval.

val from abnormal to the normal range as a result of change from the recumbent to the upright position.

In three of the cases which were observed among aircrew trainees, the P-R interval was reduced from 0.28, 0.24 and 0.24 seconds, respectively, to 0.20 seconds, on changing from the recumbent to the sitting position. These changes occurred without any significant alteration in heart rate.

In the fourth case the P-R interval was 0.40 seconds in an electrocardiogram taken in the recumbent position (Fig. 1) and 0.20 seconds in one taken in the sitting position (Fig. 2), with no change in heart rate. A thorough clinical and electrocardiographic investigation was carried out and no abnormality could be discovered other than the prolonged P-R interval when recumbent. The airman was permitted to continue flying training and served for two years as a fighter pilot overseas. Further electrocardiograms taken four years later showed no significant change from the earlier records. The P-R interval could be reduced to normal limits by excessive exercise in the recumbent position or by assuming the upright position. When a continuous record was made while tilting the individual from a horizontal to an upright position, the P-R interval usually changed just as the erect position was reached, and on tilting backward, became prolonged again just as the horizontal position was reached.

A more detailed analysis of these electrocardiograms will be presented later. The present report is intended only to bring to the attention of cardiologists the fact that marked changes in P-R interval sometimes occur with change in posture. It is suggested that a note should be made of the position of the patient during the recording of electrocardiograms, and that additional records taken in different positions and phases of respiration may provide further useful information in the event that an electrocardiographic abnormality is discovered. Additional studies on cases similar to these four may also throw further light on the physiological factors involved in the conduction of the cardiac impulse.

PNEUMONIA REVIEW OF 425 CASES IN MONTREAL 1941-1943

By Edward S. Mills, M.Sc., M.D. and Captain D. McCallum, R.C.A.M.C.

THIS report is a study of the cases of pneumonia admitted to the Montreal General Hospital during the period from April 1, 1941, to December 31, 1943. In a previous report* a similar analysis was made of the cases from October 1, 1939, to March 31, 1941. In order to present as accurate a report as possible on certain aspects of the problem of the management of pneumonia, the data in the two reports have been combined so that the conclusions are based upon all cases (425) admitted to the hospital since October 1, 1939.

DEFINITION OF PNEUMONIA CASES UNDER STUDY

The cases included in this series are those admitted with pneumonia or who developed pneumonia while in the hospital, excluding cases of postoperative bronchopneumonia and the pneumonias occurring as an agonal event in the course of other diseases. The statistical data are influenced to a certain extent by the fact that the hospital accommodation for males is double that for females and the pædiatrics service has

TABLE I.
TYPE OF PNEUMOCOCCIC PNEUMONIAS (COMBINED SERIES)

Type	*First series*	*Second series*	*Total*
I	16	22	38
II	27	18	45
III	22	23	45
IV	11	6	17
V	7	5	12
VI	2	3	5
VII	5	4	9
VIII	15	13	28
IX	1	3	8
X	0	1	1
XI	1	3	4
XII	0	1	1
XIII	0	1	1
XIV	3	2	5
XV	0	2	2
XVII	1	2	3
XVIII	3	0	3
XIX	3	4	7
XX	3	0	3
XXI	2	1	3
XXII	0	1	1
XXIII	1	0	1
XXIV	3	2	5
XXV	1	1	2
XXVII	2	1	3
XXVIII	1	0	1
XXIX	1	1	2
XXXI	0	1	1
XXXII	2	0	2
Mixed	1	5	6

* *Canad. M. Ass. J.*, 1942, **46**: 123.

a maximum of 12 medical beds. The cases in the second series (219) have been divided into two groups—a pneumococcic group and a non-pneumococcic series comprising cases in which *Staph. pyogenes* or Friedlanders were found. In the majority of the cases in the latter group, however, no pathogenic organisms were isolated. These cases are considered separately.

PNEUMOCOCCIC PNEUMONIA

In the second series there were 219 cases of pneumococcic pneumonia, as compared with 173 in the first. The diagnosis was based on isolation of a pneumococcus and typing in 134 cases in the first series and 126 cases in the second. The higher proportion of cases which failed to type in the second series may possibly be due to the more frequent use of sulfonamides prior to the patient's admission to the hospital.

(*a*) *Pneumococcic typing.*—Table I indicates quite clearly that the great majority of type-able cases of pneumococcic pneumonia fall into the first eight types. Forty-nine per cent were either Types I, II, or III.

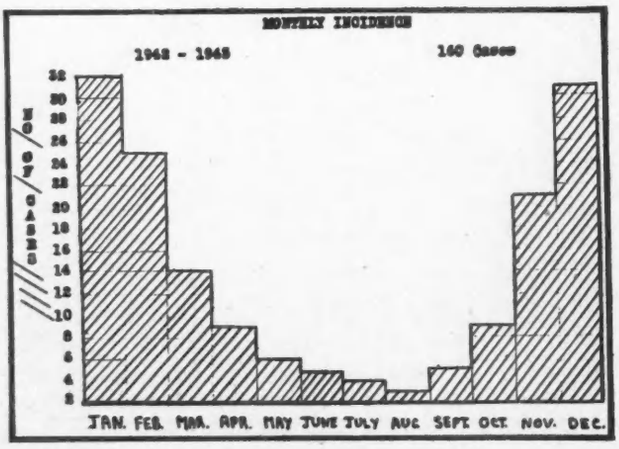
(*b*) *Age and sex incidence.*—In the second series there were 167 males and 52 females.

TABLE II.

MORBIDITY AND MORTALITY IN RELATION TO AGE GROUP

	First series		*Second series*		*Combined*	
Age group	*No.*	*Deaths*	*No.*	*Deaths*	*No.*	*Deaths*
0 - 1.....	..	..	6	0	..	..
1 - 10.....	..	..	32	0	..	..
11 - 20.....	18	0	20	0	38	0
21 - 30.....	33	0	25	3	58	3
31 - 40.....	27	1	25	2	52	3
41 - 50.....	36	0	29	5	65	5
51 - 60.....	30	6	40	5	70	11
61 - 70.....	13	3	29	7	42	10
71 - 80+...	16	3	14	5	30	8
Totals...	173	13	219	27	392	40

TABLE III.



Allowing for the difference in male to female accommodation in the hospital, the incidence of the disease predominated in the male. The disease affected all age groups; as shown in Table II, the highest morbidity being in the sixth decade.

(*c*) *Monthly incidence.*—Table III shows graphically that the maximum morbidity in Montreal occurs during December and January, months in which the daylight hours are minimum and the weather severe. The number of cases gradually decreases to a minimum during the summer months. After the low in August the incidence rises slowly, then rapidly with the onset of cold weather in November.

(*d*) *Mortality.*—In the first series there were 13 deaths, a mortality percentage of 7.7. In the second the rate was somewhat higher, 12.3%. This difference may be due to a change in the type of therapy or to an increased virulence of the disease. A study of the percentage of bacteræmic cases in the two series would seem to indicate that this difference is not one of virulence and the type of therapy had not undergone any great changes. It is suggested that the increased mortality may be accounted for by the fact that there is an increasing tendency to treat the milder cases in the home and refer to the hospital only those in which the outlook seems unfavourable.

This study was motivated to a great extent by a desire to find out why pneumonia patients die. Is the cause failure of the sulfonamide to produce bacteriostasis; to inadequate therapy; to the type or degree of the bacterial invasion, or poor resistance on the part of the host? In an attempt to answer these questions the relevant details in the case of the 27 fatal cases in the second series have been recorded in Table IV. Twelve of these 27 fatal cases were suffering from some chronic illness such as rheumatic carditis, cirrhosis of the liver, leukæmia, diabetes, syphilis, coronary thrombosis, or some equally debilitating disease. In only 15 was pneumonia not complicated by intercurrent disease. In all of these there was either multiple lobe involvement or bacteræmia or both and six were admitted to the hospital after the fifth day of the disease. Seven cases died on the first hospital day before adequate therapy could be instituted. This leaves four fatal cases admitted before the sixth day, uncomplicated by intercurrent disease, who received reasonably adequate therapy. It seems quite clear, therefore,

TABLE IV.

ANALYSIS OF FATAL CASES (27) SECOND SERIES

Hospital No.	*Age*	*Sex*	*Day disease on admission*	*Hospital day died*	*Complications*	*Associated conditions*
1531 - 43	65	M.	5	16	Type III	Coronary thrombosis. Congestive failure
7371 - 43	68	M.	9	1	Bacteræmia Type III. Multiple Lobe	Arteriosclerotic heart disease. Congestive failure
7795 - 43	69	M.	1	2	Bacteræmia Type I	Hypertensive cardio-vascular disease
6000 - 41	50	F.	?	2	No Type. Multiple Lobe	Rheumatic carditis
6055 - 41	34	M.	1	2	Bacteræmia Type V. Multiple Lobe	Rheumatic carditis
3173 - 41	75	F.	3	3	No Type	Arteriosclerotic heart disease. Auricular fibrillation
305 - 42	58	M.	2	16	No Type	Arteriosclerotic heart disease. Congestive failure
2405 - 42	58	M.	6	2	Bacteræmia Type III. Multiple Lobe	Auricular fibrillation. Pulmonary œdema
1131 - 43	58	M.	4	11	Type III. Multiple Lobe	Auricular flutter
663 - 42	68	M.	4	9	Bacteræmia Type III. Multiple Lobe	Diabetes mellitus, auricular fibrillation, pyelonephritis
2868 - 42	80	M.	?	5	No Type	Diabetes mellitus. Senility.
2425 - 41	54	M.	7	20	Bacteræmia. No Type	Lymphatic leukæmia
2334 - 41	77	M.	2	5	Bacteræmia Type I. Multiple Lobe	Gastro-intestinal hæmorrhage
7735 - 43	31	F.	11	14	No Type	Hæmolytic anæmia
7203 - 43	28	F.	?	16	Type XXXI.	Raynaud's disease
3522 - 43	78	M.	15	16	Bacteræmia Type III. Multiple Lobe	Portal cirrhosis
8114 - 43	50	M.	?	1	Bacteræmia Type IV. Multiple Lobe	Tertiary syphilis
1037 - 43	65	M.	14	1	Bacteræmia Type II.	
815 - 43	45	M.	?	1	No Type. Multiple Lobe	
7756 - 43	43	F.	?	1	No Type. Multiple Lobe	
7649 - 43	29	M.	2	1	Type VI. Multiple Lobe	
2837 - 42	65	M.	1	1	Type VIII. Multiple Lobe	
207 - 41	51	F.	7	3	Bacteræmia Type III. Multiple Lobe	
1706 - 42	65	F.	5	11	Type III. Multiple Lobe	
7707 - 41	50	M.	8	2	Bacteræmia Type III. Multiple Lobe	
7609 - 43	83	F.	5	8	No Type	
7781 - 43	25	M.	2	10	Bacteræmia Type II. Multiple Lobe	

that the majority of pneumonia deaths are due either to intercurrent disease or delayed treatment. Rarely is death the outcome when therapy is begun early in the disease and the patient is otherwise healthy.

(*e*) *Bacteræmia.* — The influence of bacteræmia upon the mortality is shown strikingly by Table V. Table VI shows the type of pneumococcus isolated in the bacteræmic cases.

(*f*) *Complications.*—Bacteræmia and pleural effusion were the main complications. The incidence of these and other complications is listed in Table VII.

TABLE V.

	First series		*Second series*		*Combined*		*% of deaths*
	No.	*Deaths*	*No.*	*Deaths*	*No.*	*Deaths*	
With bacteræmia...	14	6	22	13	36	19	52.7
Without bacteræmia	125	7	106	6	231	13	5.6

(*g*) *Type of therapy.*—Table VIII shows that the results from sulfathiazole and sulfadiazine therapy are equally good. The high death rate in those receiving both sulfonamide therapy and serum is due to the type of case in which the

TABLE VI.

COMBINED SERIES

Type	*No. of bacteræmic cases*	*No. of deaths*
I	7	2
II	9	2
III	9	9
IV	1	1
V	2	1
VII	2	0
VIII	1	1
XIV	1	0
XVIII	1	0
XIX	1	1
XXIV	1	1

TABLE VII.

SECOND SERIES 173 CASES

Complications	*No. of cases*	*%*
1. Bacteræmia	22	12.7
2. Pleural effusion	23	13.2
3. Auricular fibrillation	9	5.2
4. Pericarditis	2	1.1
5. Empyema	7	4.0
6. Cardiac decompensation	8	4.6
7. Spontaneous pneumothorax	2	1.1
8. Coronary thrombosis	1	0.5
9. Gastrointestinal hæmorrhage	1	0.5
10. Sinusitis	10	5.7
11. Atelectasis	4	2.3
12. Delayed resolution	2	1.1

TABLE VIII.

TYPE OF THERAPY (SECOND SERIES)

Drug used	*No. of cases*	*No. of deaths*
Sulfapyridine	10	1
Sulfathiazole	88	8
Sulfadiazine	80	7
Sulfathiazole and sulfadiazine (Combined)	18	2
Sulfathiazole and sulfapyridine	6	1
Serum and sulfonamide	15	6
No specific therapy	8	2

combination was used. Serum was employed only in the presence of bacteræmia, failure of sulfonamide therapy or multiple lobe involvement.

NON-PNEUMOCOCCAL PNEUMONIA

(*a*) *Staphylococcus pyogenes.* — Of the 252 cases of pneumonia, 33 were non-pneumococcal. There were 6 cases in which *Staph, pyogenes aureus* was cultured from the sputum; five in pure culture, while in the other staphylococcus predominated, though mixed with streptococci. They all were males, aged respectively 3, 30, 30, 31, 55, 62 years. The only fatality in this group was the 55-year old man. His blood culture was negative, but he had an associated staphylococcus pyelonephritis. He died of pulmonary œdema on the 12th hospital day, the 31st day of his disease. No sulfonamides were given. Two cases did not respond to sulfadiazine, but improved on sulfathiazole therapy. Two cases received sulfathiazole, and one case sulfadiazine. Pyrexia continued for nine to twenty-three days after admission. None had a positive blood culture. One developed serofibrinous pericarditis, another a spontaneous pneumothorax and pleural effusion.

(*b*) *Friedlander's pneumonia.*—The one case of Friedlander's pneumonia was a woman 43 years old, ill for over two weeks before hospitalization. She showed physical signs in both lungs, as well as cardiac decompensation, and died twelve hours after admission. Her blood culture was negative. No autopsy was obtained.

(*c*) *No organism isolated.*—This group comprised 26 cases. In none was the pneumonia lobar in distribution, though 24 of the 26 had some x-ray evidence of lung disease, as shown by irregular, hazy shadows situated peripherally or at the hilus and by increased bronchovascular markings. The duration of the radiological signs was from five days to over two weeks. The size and location of the shadows bore no relation to their duration. Some of the patients were very ill for a period of two weeks, others showed only the features of a mild upper respiratory infection. There was little correlation between the apparent severity of the infection and the radiological findings.

It would appear from a study of the cases in this group, the features of which are abstracted in Table IX, that there is no sharp distinction between the cases showing only upper respiratory infection and those with obvious lung involvement.

The same etiological agent may in some instances involve only the upper respiratory passages leading to a mild catarrhal infection. In others the infection spreads to involve smaller branches of the respiratory tree, producing a more severe and prolonged febrile illness. In neither of these is there radiological evidence of disease. In still others the infection may involve the lung proper leading to clinical and radiological evidence of a pneumonia, which is frequently peribronchial in distribution. These last patients as a rule are acutely ill, run a prolonged course, and show high fever and leucocytosis but may present few physical signs, though the process is evident in the skiagram.

Cases of the first group are not included in this survey, as they do not necessarily warrant hospital admission. There are two cases of the second group, both of whom were acutely ill but who showed no physical nor radiological signs (see Table IX). The remaining 24 cases fall into the third group, as each one presented x-ray evidence of involvement of the lung proper.

SUMMARY AND CONCLUSIONS

1. The death rate from pneumococcic pneumonia during the years 1939 to 1943 was approximately 10% of those affected.

TABLE IX.—ABSTRACT OF NON-PNEUMOCOCCAL PNEUMONIA CASES, NO ORGANISM ISOLATED

Case No.	*History*	*Physical signs*	*White blood cells on admission*	*X-ray*	*Type and duration of fever*	*Sputum culture*	*Response to sulfonamides*
6553 - 42	Male, 30 yrs. Sudden c chest pain, cough, fever.	None	10,500	None. Two occasions	Low maintained 3 da.	No sputum	None given
6554 - 42	Male, 23 yrs. Sudden c chest pain, cough, fever.	None	8,600	None. Two occasions	100 deg. 1 da.	No sputum	None given
2384 - 41	Female, 24 yrs. Insidious chest pain, loss of strength.	Dulness, moist râles RLL	7,800	Fluid rt. pleural cavity. Pleural thickening, 12 da.	Intermittent, 3 da. Crisis	No fluid obtained on 3 aspirations	Pyr. gr. 150. Thi. gr. 155.
3635 - 41	Male, 17 yrs. Sudden c chest pain.	Fluid rt. base	10,500	Fluid level. Shadow RLL	Intermittent 10 da. Remittent 3 da.	Fluid sterile	Thi. gr. 750.
561 - 42	Baby. Insidious c cough, fever, dyspnœa, anorexia.	Dulness rt. Fine râles throughout	13,300	Moderate increase b.v.m.	104 deg. 1 day	Throat culture. Normal organisms	Thi. gr. 98.
1642 - 42	Female, 9 yrs. Insidious c cough and chest pain.	Friction rub, harsh B.S. RLL. No râles	15,400	Dense shadow RLL c inc. b.v.m. on later plate	Afebrile	Throat culture. Normal organisms	None given
4095 - 42	Female, 34 yrs. Insidious c weakness, chest pain, headache.	Consolidation H. ant. chest	8,350	Increase hilar shadows left. Increase b.v.m. rt.	Remittent and intermittent 7 da. lysis	Normal organisms	Thi. gr. 495
4410 - 42	Female, 43 yrs. Insidious c fatigue; later chills.	Consolidation RLL	8,300	Inc. density rt. base. 10 da.	Maintained, 4 da. Remittent, 4 da.	Normal organisms	Thi. gr. 90
6214 - 42	Male, 62 yrs. Insidious c chest pain, hyperæsthesia.	Râles both bases. Friction rub rt. axilla	15,800	Inc. b.v.m., lower lobes	Intermittent, 6 da.	Normal organisms	Diaz. gr. 580
6555 - 42	Male, 29 yrs. Insidious c fever, cough.	Harsh B.S., râles LLL	6,400	Inc. hilar shadows, b.v.m. LUL, RUL, RLL	Afebrile	No sputum	None given
6774 - 42	Male, 64 yrs. Trauma to chest. Then pain, dyspnœa.	Coarse râles, H.	17,000	Bronchopneumonic shadows RLL, LLL.	Low remittent (100 deg., 12 da.)	Normal organisms	Thi. gr. 315
7202 - 42	Female, 21 yrs. Sudden aches, chills, cough.	Fine râles, LLL	13,400	Inc. hilar shadows and b.v.m., 1 wk.	Remittent, 4 da.	Normal organisms	None given
641 - 43	Baby. Cough and vomiting.	Dulness rt. chest. Coarse râles throughout	14,200	Inc. hilar shadows c hazy shadow, RLL.	Remittent 3 da. Lysis	Throat culture. Normal organisms	Thi. gr. 90
726 - 43	Female, 59 yrs. Insidious c cold, cough, nausea.	Râles both bases	13,600	Inc. b.v.m., LLL.	103 deg., 1 day	Normal organisms	Diaz. gr. 620
778 - 43	Baby. Insidious c cold, cough, vomiting.	Dulness RLL. Râles throughout	15,400	Inc. b.v.m., RLL.	Intermittent 4 da. Crisis	Normal organisms. Throat culture	Thi. gr. 80
934 - 43	Male, 28 yrs. Sudden c malaise.	Inc. B.S., LLL.	?	Bronchopneumonic shadows LLL, 5 da.	Remittent 5 da.	Normal organisms	None given
1284 - 43	Male, 23 yrs. Sudden. Chill, fever, aches, pains.	None	8,300	Inc. hilar shadows. Inc. b.v.m., LLL.	Remittent 5 da. Lysis	Normal organisms	None given
1309 - 43	Male, 25 yrs. Sudden. Chills, fever, malaise, headache, cough.	Signs obscured by previous therapeutic pneumothorax, rt.	7,800	Rt. pneumothorax c inc. hilar shadows and b.v.m., RLL, 2 wks., +	Remittent and intermittent, 2 wks.	Normal organisms	2 courses s without result
1364 - 43	Male, 27 yrs. Sudden c fatigue.	Harsh B.S., LUL.	5,800	Inc. hilar shadow lt. Peripheral shadow H. 2 wks.	Remittent and intermittent, 8 da.	Normal organisms	None given
1365 - 43	Female, 26 yrs. Insidious c sore throat, malaise, cough.	Râles, harsh B.S., LLL.	8,300	Inc. hilar shadow lt. pneumonitis, 2 wks.	Remittent and intermittent, 11 da.	Normal organisms	None given
1570 - 43	Female, 22 yrs. Insidious c cough.	Fine râles, RLL.	10,900	Inc. hilar shadows and b.v.m.	Afebrile	Normal organisms	None given
2302 - 43	Male, 25 yrs. Insidious c cough, drowsiness.	Dulness LUL. Fine râles RLL.	11,800	Inc. hilar shadows and b.v.m., RLL. 2 wks.	Remittent low, 5 da.	Normal organisms	Diaz. gr. 360
2726 - 43	Male, 29 yrs. Insidious c head cold.	None	5,000	Shadow RLL. c Inc. b.v.m. rt.	Afebrile	No sputum	None given
2294 - 43	Male, 43 yrs. Sudden c fever, headache, malaise, chills.	Consolidation LUL.	6,800	Inc. hilar shadows and b.v.m.	Maintained, 6 da. Lysis	Type XIX, few	Diaz. gr. 410
2807 - 42	Male, 23 yrs. Sudden c chill, cough, red sputum.	Consolidation RLL.	17,800	Pneumonitis and inc. b.v.m., LLL.	105 deg., 3 da.	Normal organisms	Diaz. gr. 210
4518 - 42	Female, 21 yrs. No history.	Consolidation LLL.	9,000	Inc. density, b.v.m., LLL. 1 wk.	Crisis, 2 da.	Normal organisms	Diaz. gr. 270

b.v.m.—broncho-vascular markings. B.S.—breath sounds. da.—days.

2. The factors influencing the mortality in the present series were delayed therapy, intercurrent disease, especially heart disease, and senility.

3. The mortality in otherwise healthy individuals under 70 years who are adequately treated within 48 hours of the onset of the disease is almost negligible.

4. Bacteræmia at the time of admission imposes a 50% mortality.

5. During the period under study there were 26 cases of pneumonia of the peribronchial type. In none of these patients were pathologic organisms found in the sputum. All but two showed radiological evidence of peribronchial infiltration. In many the physical signs were abortive although some were acutely ill and ran a prolonged course. All recovered.

6. The continued high death rate in bacteræmic cases (50%) imposes upon the physician treating pneumonia the obligation of determining the presence or absence of a bacteræmia in every case of pneumonia in order that those with a positive blood culture shall receive the benefits of both serum and sulfonamide therapy. By this means it may be expected that further reduction in the death rate will be effected.

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ANTERIOR POLIOMYELITIS IN PREGNANCY*

By Murray Blair, M.D., C.M. and C. E. Robertson, M.D.

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IT is perhaps the advent of another method of treatment of poliomyelitis that has again awakened the interest of the profession. Obstetricians are again interested in the relationship of poliomyelitis to pregnancy, and it is now well established that the disease contracted in the pregnant mother will have no effect whatever on her unborn child.

Many articles have been written in support of this belief and the many cases presented support the theory. Our own cases will but add further evidence to a truism that needs no further support.

The theory itself must be based on the fact that the placenta will not allow the virus of poliomyelitis to pass through to the fetus. The inherent weakness of the theory, not made clear in all discussions, is that since the virus of poliomyelitis has never been demonstrated in the human blood stream, it is doubtful if the human placenta has ever been called upon to demonstrate its defensive mechanism in this regard. Indeed, in those other diseases caused by the viruses of submicroscopic organisms which have been demonstrated in the blood stream the placenta has only too often failed to protect the fetus. The viruses of such diseases as measles, chicken pox, influenza, encephalitis and vaccine viruses are known to pass at times through the placenta and attack the fetus.

Congenital poliomyelitis has never been demonstrated. The occasional stillbirth in maternal poliomyelitis cases has never been demonstrated to be a "polio" death.

For the sake of record only we present our experience with pregnancy in the presence of maternal poliomyelitis at the Vancouver General Hospital. It differs little if any from the experience of other observers. Our six cases appeared over a period of twelve years. During that time some 25,427 cases were delivered in this hospital. They do however, present that complication in obstetrics from nearly every angle.

We realize that the diagnosis of poliomyelitis must be correctly established in every case. We have taken pains to include no case in which there is any doubt. It will be noted that two cases showed no paralysis.

In all 6 cases the diagnosis has been established by the City consultant in infectious diseases and of late years, also by the Department of Physiotherapy of the hospital.

CASE 1

Mrs. E.S., aged 23, grava-III, para-II. This patient was eight months' pregnant when admitted in August, 1931, and she died of a respiratory paralysis on the 6th day following admission. There was paralysis of both lower legs with absent knee and ankle jerks. Intranasal oxygen was administered, but no Drinker apparatus was then available. At autopsy the mother's spinal cord showed the typical changes of poliomyelitis. The fetus was well formed, 47 cm. long, and microscopic examination of the spinal cord showed no pathological changes.

CASE 2

Mrs. M.N., aged 20, grava-I, para-0. This patient was admitted in December, 1936, when 6 months' pregnant. She had an eight-day history of malaise and vomiting with paralysis of the lower limbs and diplopia. For six days she had been unable to control her bladder.

* Presented before the Vancouver Medical Association, Clinical Section, January 18, 1944.

Eighteen days after admission the patient developed a cystitis with a septic temperature. After four weeks in hospital she was delivered of a premature living male child. The total labour time was seven hours, during the second stage of which the patient became very dyspnœic and cyanosed. The baby was a footling presentation and weighed 1,260 gm. There were no difficulties in resuscitation and the child appeared to be in fairly good condition. However, about four hours after delivery, respirations became laboured, with the production of much mucus, and nine hours later the child died. The findings at autopsy were: prematurity, laceration of the tentorium, and fetal atelectasis. Microscopic examination of the spinal cord revealed no abnormalities. The mother's convalescence was uneventful.

CASE 3

Mrs. E.F., aged 22, grava-?, para-?. This patient was admitted in September, 1942, with the complaints of neck stiffness, pain in the lumbar region and thighs and weakness of the extensor muscles of the thighs. The cerebrospinal fluid showed a cell count of 180 leucocytes, being 94% lymphocytes. No organisms were grown from this fluid in 12 hours and in 38 hours. On admission the patient was six weeks' pregnant with a slight vaginal flow. Six days after this she aborted spontaneously. Her subsequent course was uneventful and she was up and walking about before discharge.

CASE 4

Mrs. W.N., aged 26, grava-III, para-II. This patient entered the hospital in November, 1942, complaining of nausea and vomiting, crampy pains in calves and thighs, with soreness and stiffness of the neck and back. No paralysis or changes in reflexes was demonstrated. The spinal fluid contained 144 white blood cells per c.mm. The patient was 4½ months' pregnant at this time. She was discharged well after twenty days in the hospital. Due March 25, she went into labour on March 26. The first stage of labour lasted 14½ hours, the second stage twenty-five minutes, and the third stage five minutes. The child was born in an R.O.A. presentation with low forceps traction. The puerperal period was usual in every respect and the patient was discharged on her 9th day post-partum. The baby weighed 4,050 gm. showed no asphyxia and developed in a normal manner subsequently.

CASE 5

Mrs. S.A., aged 24. This patient was admitted September, 1942, when six months' pregnant, with headache and pain in the lower legs and back. Both knee jerks and the right ankle jerk were absent. There was complete paralysis of the right lower limb and marked weakness of the left. She was discharged one month later with persisting paralysis of the flexors of the right hip and of the right tibialis anterior muscle. The patient was subsequently delivered in a hospital in another city, but the course of labour was essentially normal, as was the child.

CASE 6

Mrs. A.J., aged 22, para-II, grava-I.

This patient's previous confinement was in July, 1941; she was in labour 12 hours at this time, giving birth to a full term child with no complications.

In September, 1942, when approximately three months' pregnant (last normal menstrual period, May 30, 1942) she developed headache and vomiting followed shortly by neck stiffness, loss of speech and paralysis of both arms. She was admitted to the hospital on September 10 unconscious and markedly cyanosed. Artificial respiration and respiratory stimulants were given immediately and the patient placed in the Drinker apparatus. The patient was incontinent of bladder and bowel and there was complete paralysis of the diaphragm and intercostal muscles. However, from this date she gradually improved and one month later was able to remain out of the respirator for 1¾ minutes daily.

By the time of delivery, March 12, 1943, she was remaining outside the respirator from 7.30 a.m. to 3.30 p.m. and from 6.30 p.m. until 9.00 p.m. for a daily total of 11 hours. There was no voluntary power of the abdominal or lumbar muscles at this time. The neck muscles were not strong enough to lift the head and the majority of muscles of the shoulder girdle and upper arms were almost entirely paralyzed. Also there was no action of the intercostals, and diaphragmatic movements were still impaired. The muscles of the lower limbs were normal.

The patient's due date was March 9. However, she gave no signs of going into labour. On March 11 medical induction was commenced, using di-œstrol, 15 minims every 3 hours for 6 doses, followed by 1½ oz. of castor oil and 5 gr. of quinine. Labour pains began at 6.00 a.m.; the membranes ruptured at 7.30 a.m. and a normal female child was born at 8.20 a.m. within 3 hours of the onset of her pains. The patient was taken to the labour room in the respirator, but was removed from this for the actual delivery. A local anæsthetic was planned, but labour progressed so rapidly that this was never given and the patient received only open ether with each pain. The baby was born by vertex presentation in an L.O.A. position and weighed 3,030 grams. The placenta was expressed 15 minutes later by the method of Schultz. No episiotomy was required and the perineum was intact.

The puerperium was normal in all respects and the patient's temperature in the post-partum period never rose above 98.8°. As for the child, no special resuscitation measures were necessary and it has at no time revealed any abnormality.

One might think that this case would present a typical example of the independence of the nervous uterine mechanism from the central nervous system. However, paresis of the lower extremities and lower torso cleared very early and her chief paresis was in the chest, arms and neck. She was quite conscious of labour pains and was able to help expel the baby over the perineum.

She was visited in December, 1943, when the baby was six months old. The baby is well developed physically and mentally. The mother now walks about, but weighs only 85 lb. The distortion of hands and arms is very marked.

SUMMARY

We present this hospital's experience in poliomyelitis complicated by pregnancy during the past 12 years.

The six cases of poliomyelitis in pregnancy have very complete case records, and autopsies of both mother and child have been recorded wherever obtainable.

It is interesting that, by chance, we present almost every phase of the disease at every period of intrauterine life.

We point out the well known fact that the virus of poliomyelitis has never been demonstrated in the blood stream. If it be present, it is never sufficient to invade the fetus.

The safety of the child *in utero*, even in the presence of the most virulent attack compatible with life, is well demonstrated in our series.

We appreciate the helpful criticism of the article afforded us by Dr. C. E. Dolman, Professor of Bacteriology, University of British Columbia.

718 Grenville St.

INFECTIOUS MONONUCLEOSIS

By Major N. McGillivray, R.C.A.M.C.

THIRTY-SIX proved cases of infectious mononucleosis are reported from a large Canadian military hospital, during 34 months in southern England. As there were about 10,000 admissions annually, the disease was unimportant as a cause of morbidity in the Canadian Army. The patients were all Canadian soldiers of previous good health, engaged in various types of duty in southern England. Fairly comparable methods of history taking and examination were used in all cases.

Clinical Manifestations

Incidence, seasonal. The disease would appear to occur more commonly during the spring and summer months.

Age.—No useful deduction can be made, since military expediency determines age distribution. The average age of these patients was 24½.

Mode of presentation.—Twenty-two of the 36 cases were readily diagnosed on clinical grounds, at the admission examination. These cases all gave the expected history of malaise, fever, sore throat, and enlarged tender lymph glands. The diagnosis was later confirmed by blood film, and the Paul-Bunnell test. Four cases were not recognized on admission, being confused with meningitis, acute tonsillitis and mumps. Adequate history and examination of blood film, followed later by a Paul-Bunnell test were enough to make the diagnosis.

Ten cases had an unusual onset, and the initial diagnoses were as follows: (*a*) pyrexia of unknown origin, 2 cases; (*b*) post-influenzal pneumonia, 1 case; (*c*) acute tonsillitis with drug eruption, 1 case; (*d*) acute tonsillitis, 2 cases; (*e*) infective hepatitis, 2 cases; (*f*) infective hepatitis with tonsillitis, 1 case.

Pyrexia of unknown origin:

Case 1

This patient presented with fever, reddened, painless throat, and painless slight enlargement of lymph glands and palpable spleen. Diagnosis was made from routine blood film. The Paul-Bunnell test was positive up to 1:32.

Case 2

This man, previously in hospital with chronic prostatitis, re-entered hospital with fever, and a large, inflamed plaque in the skin over one tibia. There was a red, painless throat, enlarged cervical lymph glands and splenomegaly. Leucocyte count was 5,400. The Paul-Bunnell test was positive in dilutions up to 1:40.

Case 3

On initial examination, fever and slight sore throat were noted but there was no glandular enlargement. Leucocyte count was 6,000. By the 12th day in hospital, the sore throat had increased; enlarged, slightly tender cervical glands had appeared, and the leucocyte count had risen to 24,600, with characteristic differential count. The Paul-Bunnell test was positive up to 1:1,024.

Post-influenzal pneumonia.—On admission, October 10, 1940, the diagnosis was influenza with bronchopneumonia. Infectious mononucleosis was diagnosed on the 15th day in hospital. There was slight redness of the throat, and enlarged glands, but no splenomegaly. Admission leucocyte count was 5,800 and at the time infectious mononucleosis was diagnosed, was 9,000 with a Paul-Bunnell reading positive 1:256. At this time, there was a mononuclear percentage of 91. It is not clear from the notes, whether the pneumonia preceded the infectious mononucleosis by a few days, or coincided with it. From the notes it would appear that the pneumonia (apparently a primary atypical pneumonia) reached its height 5 days before the infectious mononucleosis was at its peak.

Acute tonsillitis with drug eruption.—This was the first case of infectious mononucleosis with a skin eruption, and was not recognized until routine blood film yielded the diagnosis. Generalized glandular enlargement was not noted, the spleen was not palpable, and sore throat was slight. There was however a monocytosis of 82%, leucocyte count of 10,400, and a Paul-Bunnell test positive up to 1:1,024.

Acute tonsillitis:

Case 1

This appeared to be a severe case of acute tonsillitis with more marked cervical adenitis than usual. There was no splenomegaly. The blood film showed a monocytosis of 62%, later rising to 76%, giving the correct diagnosis. The Paul-Bunnell test was positive up to 1:512.

Case 2

This case was at first diagnosed acute tonsillitis with cervical adenitis. There was no splenomegaly, and the correct diagnosis was not made until the 10th day in hospital. At this time the medical officer became suspicious, as the fever and sore throat were not improving. Leucocyte count was 9,400 with 78% monocytosis, and the Paul-Bunnell was positive up to 1:512.

Infective hepatitis.—These three cases presented with jaundice as a prominent feature, and the correct diagnosis was not immediately reached, although it was strongly suspected in the second and third cases. The diagnosis was not made clinically, until characteristic blood films had been obtained.

These brief case reports will illustrate how diagnostic errors occur, if differential blood films are not done. The disease should be suspected in cases of uncomplicated tonsillitis which are disproportionately ill, are persisting, or have curious associated skin eruptions.

Glandular enlargement.—Some glandular enlargement was usually present in all cases. Cervical glandular enlargement was a constant finding, and axillary glandular enlargement was almost as common. Some axillary gland enlargement, particularly left-sided, is a common finding in soldiers, doubtless following vaccination. Epitrochlear and inguinal glandular enlargement were less prominent in this series. Of 17 instances where the submental area was specifi-

cally mentioned, there was enlargement noted in 12. In the anterior group, the upper half of the triangle was the site in all cases. Thus the anterior group was most constantly enlarged, the posterior group slightly less so, and the submental group somewhat less still.

In 23 instances, some note re the tenderness of the cervical glands was made. Six cases showed no tenderness, 4 cases slight tenderness, 1 case severe tenderness, and the remainder moderate tenderness. No relationship was established between the degree of tonsillitis and glandular enlargement. In at least 2 cases, glandular enlargement was present beneath the upper part of the sternocleidomastoid muscle, a site not very commonly involved in other lymphadenopathies. The glands were discrete in all instances. No secondary suppurative infections occurred.

Splenomegaly.—In 20 cases, the spleen was palpable, usually when first seen. In 16 cases it was not palpable. In no case was it enlarged more than a descent of one or two fingers' breadth on full inspiration. Tenderness was not described.

Throat lesions.—In this series disproportion was noted between the degree of soreness, and the signs in the throat. Two cases went their whole course with neither throat symptoms nor signs.

Throat swabs were done in 17 cases. Group A hæmolytic streptococci were found in 12, Vincent's organisms in 2, and none in 3.

Jaundice.—Six cases had jaundice as a prominent sign, 4 on admission, 2 later. All had the prodromal symptoms of infective jaundice, *i.e.*, nausea, anorexia, dark-coloured urine, etc., for periods ranging from 1 to 14 days prior to development of jaundice. Peak van den Bergh readings ranged between 5.2 and 8 units. In 2 cases, the liver was enlarged, never grossly. There was splenomegaly in 5 cases. Five of the 6 had a leucocytosis. The jaundice was brief, the van den Bergh reaching normal in a week or less from the onset in 5 of the 6 cases, and in 10 days in the sixth case.

The jaundice of infectious mononucleosis might be confused with that of infective hepatitis. Some points about the latter from an unpublished series in the same hospital are helpful. In 44 cases from May to November, 1941, the jaundice lasted three weeks (measured by the van den Bergh reading). Liver enlargement was noted in 50% and splenic enlargement in 25% of the cases. Fever, sore throat, and adenopathy were not present. None had leucocytosis or unusual cells; half had neutropenia (less than 50% polymorphonuclear cells).

Skin.—There were 5 cases with extensive skin lesions; 3 of these were also jaundiced. Brief case histories are as follows:

CASE 1

A 26-year old officer admitted to hospital because of his skin lesion, complained of slight sore throat on admission. The left tonsil was ulcerated and red. He had a maculopapular eruption mostly on his extremities, but involving the trunk to a less extent. No mention was made of glandular enlargement. His white cell count was 10,400 with 82% mononuclear cells in the smear. The Paul-Bunnell test was positive 1:1,024. The skin eruption faded out in 4 days, but 2 weeks later, the white cells were 7,500 with 84% mononuclears in the film.

CASE 2

Because of a severe throat lesion (culture negative), this patient was started on a course of sulfapyridine. After the drug was given, a rash of pin-point macules was noted over the epigastrium, on the sixth day of his illness. This rash cleared within 3 weeks of its appearance. It is possible that sulfapyridine played some part in its production. The white cell count on admission was 8,900 with 60% mononuclears. During the skin eruption, it rose to 15,000 with 84% mononuclears. Paul-Bunnell test was positive 1:246. Throat symptoms and signs were present and glandular enlargement, but not splenomegaly.

CASE 3

There was sore throat with hæmolytic streptococci cultured, glandular enlargement, splenomegaly and leucocytosis ranging up to 23,800 with 82% mononuclears. Paul-Bunnell test was positive 1:64. The skin eruption began on the 10th day of his illness at which time he was also jaundiced. It started as a morbilliform eruption on the chest and medial surfaces of arms and the back. It became more pronounced over the trunk than the extremities and was maculopapular. It increased and the skin became generally œdematous. He later got puffiness about his eyes and conjunctivitis. The eruption reached its peak on the 4th day after its onset. By the 5th day the skin had assumed a purplish hue. It had almost completely cleared by the 10th day and left no residual signs.

CASE 4

The eruption began on the 15th day of his illness, 4 or 5 days after he became jaundiced. It started as a petechial eruption involving the trunk and back, most profuse over the lower back. At the time, the patient was improving symptomatically. In 24 hours the rash became morbilliform and his tongue was very heavily furred, with one clear area suggesting a mucous patch. The eruption faded quickly, and was almost completely gone by its 5th day, although faint remnants could still be seen on the 12th day. White blood cells 15,100, 74% mononuclears, Paul-Bunnell 1:320, blood Wassermann and Kahn were negative.

In cases 1, 3 and 4 the eruption would seem to be part of the disease. Case 2 was complicated by the fact that sulfapyridine had been given before the rash reached its peak, although the most marked disturbance in the blood picture coincided with the height of the rash. In case 5, the eruption was probably a complication of

the bizarre pneumonia. In none of the cases were the skin lesions irritating.

Complications and unusual features.—Five cases developed complications either during the active stage of the disease, or during convalescence. One had quinsy which ran the usual course, and cleared quickly after evacuation of the abscess.

Three developed pneumonia. Two of these have been described already. The third case developed cough with râles in the right lower lobe during early convalescence, infectious mononucleosis, before the blood picture had quite reached normal.

One case developed a lung abscess in the right hilar region. The blood picture had just reached normal. He subsequently developed an otitis media, and manifestations of hysteria. The lung abscess cleared in 5 weeks without operation.

Transient puffiness about the eyes was noted once in another case. No suppurative adenitis occurred in any case.

It seems worthy of mention that in 4 cases, the onset of infectious mononucleosis followed immediately on another infection. In one, the last case mentioned, the onset of symptoms of infectious mononucleosis coincided with a septic infection of the hand with secondary axillary adenitis. Two other cases followed immediately on a cellulitis of the face, and a rather extensive impetigo respectively. The fourth case, aged 30, was admitted on April 27, 1943, complaining of severe headache, fever, and photophobia. On examination there was definite neck rigidity, and pain occurred when neck flexion was attempted. There was no sore throat, adenitis, or splenomegaly. Leucocyte count was 13,000 (no differential count was done) and lumbar puncture yielded a slightly cloudy fluid containing 400 polymorphonuclear cells. This fluid was sterile on culture. He was immediately given large doses of sulfapyridine, and within 24 hours, had become afebrile, was showing signs of improvement and the leucocyte count had dropped to 6,800. At this time, he appeared to have a mild purulent meningitis responding well to sulfapyridine. The improvement continued for a further 24 hours, but on April 30, his fourth hospital day, he began to show a new set of symptoms. He complained of a sore throat and painful enlargement of cervical glands. His temperature, previously normal for 2 days, rose and his leucocyte count also rose from 7,700 on April 29 to 14,200. He did not complain of meningitis symptoms other than some pain on neck movement obviously related to the tender adenitis. A differential count was done and revealed monocytosis of 75%. The fauces were inflamed, and hæmolytic streptococci were cultured from a throat swab. A Paul-Bunnell reading obtained on April 30 was positive up to 1:80. The symptoms increased for three or four days and he then began to improve. Several lumbar punctures were done and showed a progressive dimunition in the pleocytosis. Recovery was uneventful, and he was discharged on his 30th hospital day. A Paul-Bunnell test was done on the spinal fluid at the height of the disease and was reported as negative.

It was felt in this case, that he had had two diseases. No mention of a polymorphonuclear meningitis associated with infectious mononucleosis could be found in the literature, although lymphocytic meningitis has been reported. The meningitis antedated the infectious mononucleosis by three or four days, and was responding to sulfapyridine when the new chain of symptoms appeared. A differential count to dissociate the two conditions was unfortunately not done prior to onset of sore throat, adenitis and splenomegaly.

Laboratory findings.—Throughout this paper for purposes of simplification, "percentage monocytosis" or "percentage mononuclear cells" represents the total percentage of white cells of the non-granular group, and will therefore include normal appearing lymphocytes and endothelial cells. However, the large part of the monocytosis was made up in all cases of atypical mononuclear cells.

All patients had repeated leucocyte counts and differential counts. In 9 cases, the Paul-Bunnell test was repeated once. False positive blood Wassermanns and Kahns have been reported as occurring in this condition. In 8 cases where a Wassermann, a Kahn, or both were done, no positive results were obtained.

Several points are of interest in regard to the leucocyte counts. First, 9 cases ran their whole course without a leucocytosis (10,000 or more). In three more cases, the white cell counts were low when the diagnosis was made. The number of counts done in these cases varied from two to seven. The normal level of the leucocyte count in these cases did not appear to influence the percentage of mononuclears in the differential count; in fact, one of the highest per-

centage of mononuclears found (94%), occurred when the leucocyte count was 8,400; nor did the normal level of the count seem to influence the Paul-Bunnell results.

Paul-Bunnell test.—In 9 cases, the Paul-Bunnell tests were repeated. In 2 cases no change in the titre occurred after 2 and 4 weeks respectively. In both of these cases the leucocyte count had become normal and the differential counts were approaching normal at the time of the second reading.

In 2 cases the Paul-Bunnell was repeated after 3 weeks' and 2 months' interval respectively. Both were negative. The leucocyte count and differential count were both normal at the time of the second reading.

One case had three readings done. Here the titre dropped from 1:128 to 1:64 in 11 days. The leucocyte count had dropped from 19,200 to 9,000 and the percentage of mononuclear cells from 95 to 87%. Two weeks later, the Paul-Bunnell test was negative (1:16). At this time, the leucocyte count was still normal, but the percentage of mononuclears was still high, being 84%.

In one case, the titre rose from normal (1:16) to 1:256 in two weeks. The initial negative test was obtained in the presence of the classical clinical and hæmatological picture of infectious mononucleosis with an initial leucocyte count of 14,600 and mononuclear percentage of 73%.

In one case the titre dropped from 1:512 to 1:64 in 4 weeks. The leucocyte count was normal throughout in this case. At the time of the second reading, the differential count was normal, 25% mononuclears being present.

In the final case, the titre dropped from 1:128 to 1:32 in 2 weeks. Again the leucocyte count was normal throughout. The percentage of mononuclears had dropped from 72 to 60.

From the above data it will be seen that it is difficult to correlate accurately the titre obtained, with the leucocyte count and differential count. It is to be noted, however, that a positive Paul-Bunnell test can be obtained when the leucocyte count is normal, and that the Paul-Bunnell test can be negative early in the disease, later to become positive. In only one instance, however, was the Paul-Bunnell test positive in the apparent absence of atypical mononuclear cells.

One further case is quoted to bring forth a point of interest. He was one of the group who were jaundiced, and 10 days after admission, developed a quinsy. A week before this event, the leucocyte count was 14,300 and in the differential film the polymorphonuclear percentage was 11%. When the quinsy developed the total leucocyte count changed little, being 13,600, but the polymorphonuclear percentage rose to 60. Four days later, after subsidence of the quinsy, the differential count had relapsed towards its former appearance, the polymorphonuclear percentage being 25% and the leucocyte count 8,100. Thus although a neutropenia occurs in infectious mononucleosis, a suppurative process can still elicit a good polymorphonuclear response.

TREATMENT

This was symptomatic, including mild analgesics, throat irrigation and sulfonamides in a few cases with severe throat lesions. The patients were not discharged until differential counts were almost normal and all received a period at a convalescent depot.

SUMMARY

Thirty-six cases of infectious mononucleosis among Canadian soldiers stationed in England are reviewed. One-third presented some difficulty of diagnosis, which is described. Clinical details including disproportion of throat symptoms and signs, jaundice and skin rashes are discussed. Complications by quinsy, skin rash and pneumonia are described. Relationship to acute antecedent infection is described.

Acknowledgment and thanks are due to Majors N. McKinnon and D. Magner, Officers-in-Charge of the hospital laboratory and to Lieut.-Col. R. C. Dickson, Officer-in-Charge of the Medical Division for their assistance in preparing this paper; also to D.M.S., Canadian Forces, for permission to publish it.

Such great advances have been made and are daily being made in the knowledge of the causes and prevention of disease that the attention and energies of medical students, leaders and practitioners very easily become entirely absorbed in the disease themselves; and the patient, the sufferer, he who has to endure the disease, is forgotten. He becomes an interesting spectacle, merely the stage of an action, the convenient location of a battle which in itself is tremendously interesting.—Roberts, *The Education of the Doctor.*

Case Reports

POST-TRAUMATIC CONFUSIONAL STATE TREATED WITH MASSIVE DOSES OF NICOTINIC ACID*

By H. Lehmann, M.D.

Montreal

In 1940 Jolliffe[1] and others published from the Bellevue Hospital, New York, a series of cases presenting clouding of consciousness, grasping, sucking and cog-wheel rigidity treated successfully with nicotinic acid. In 1941 Sydenstricker and Cleckley[2] reported excellent results with large doses of nicotinic acid in an impressive number of cases with stupor, lethargic states and other psychiatric disorders, the common feature of which was the presence of confusion. Since then nicotinic acid has been extensively used by many workers in the treatment of confusional states of obscure origin or associated with alcoholism, malnutrition and avitaminosis.

We have not found any reference to the use of nicotinic acid in the treatment of a confusional state directly due to cerebral trauma and excluding with reasonable certainty toxic factors or vitamin deficiency as causative agents. The following case was observed in the Verdun Protestant Hospital.

A.F., a forty-three year old accountant, was on his way to work in the morning when he was knocked down by an automobile. He lost consciousness and was taken by ambulance to a city hospital. On admission he was semi-conscious, his clothes covered with vomitus. He had multiple contusions of the face and arms. There were no fractures. Treatment was difficult as the patient was extremely restless, uncooperative and violent. He repeatedly attacked nurses and other patients. His speech was incoherent. He did not recognize his wife. A lumbar puncture could not be performed at that time because the patient was too resistive. He was incontinent and had to be fed, but it should be noted that with the exception of the first three days after the accident, the patient did not refuse nourishment and medications when they were offered to him. His mental state did not improve and after six weeks he was transferred to the Verdun Protestant Hospital with the diagnosis of cerebral commotion and maniacal psychosis.

When admitted to our hospital he was agitated and delirious. Physical examination revealed a thin, well-developed man, looking his stated age. His colour was good; temperature normal. The skin and tongue were in good condition and there were no gastro-intestinal symptoms or other signs indicating avitaminosis. The only positive findings were slight albuminuria and glycosuria, which disappeared within a week, and hyperæsthesia to pin-prick and other painful stimuli. Otherwise, the neurological examination was negative. A lumbar puncture, done under intravenous anæsthesia, produced spinal fluid normal in every respect and under normal pressure. Blood and serological findings were normal.

The outstanding features of the patient's mental state were his extreme psycho-motor restlessness and his marked confusion. He required almost continuous restraint and sedatives. There was pressure of speech and the prevailing mood was one of elation. It was noticed that he referred constantly, although in an irrational manner, to his surroundings, commenting incoherently on the various sensory stimuli to which he was exposed. At times, a complaining note appeared in his rambling speech and he would burst into tears. He knew his name, but was disoriented in place and time. He said that he was suffering from an awful headache, and this was about the only relevant statement he was able to make. When his perception was tested he called a shoe "a bit of canned fish". When asked how he felt, he replied: "I feel just like a bad attack of onion business. We seem to take lessons on the verandah and I can't get the hang of it". A word-association and Rorschach test gave evidence of very marked perseveration and showed other signs characteristic of marked "organic" mental impairment.

His wife was interviewed. She had been married to him for 20 years. He was born in England, had served in Mesopotamia during the last war and in 1917 contracted "sand-fly fever". In 1920 he required hospital treatment for severe epistaxis which lasted several days. Later he had acute appendicitis but was not operated upon because his bleeding time was supposed to be too prolonged. The patient's mother and one brother also are reported to bleed unduly long after an injury. Until a few years ago, the patient had occasionally suffered from a severe headache that would be relieved by epistaxis. There was no family history of nervous or mental disorders. Because of this history, the patient's bleeding and clotting time were checked by us and found to be normal.

Aside from the above named conditions the patient had always been healthy. His wife described him as a jovial, easy-going person and relates the remarkable fact that he lost his temper only once in the twenty years of their married life. He appeared always happy, was inclined to be jocular, liked company and got along easily with everybody. His habits were regular. He took alcohol very rarely. His appetite was good and his diet well balanced. (This was checked in detail.) He was making progress in his work as an accountant. There was nothing wrong with him when he left for work as usual on the morning of the accident.

A diagnosis of post-traumatic confusional state was made. The prognosis was considered to be favourable for the following reasons:

There were no complicating factors such as alcoholism, arteriosclerosis, or G.P.I. There were no neurological symptoms indicating localized brain damage. Last, but not least, the patient had been a well-adapted personality, with good marital adjustment, prior to his psychosis.

That the personality factor has to be considered in computing the chances for the outcome of an organic brain disease has been demonstrated by Greenhill and Yorshis[3] who found that in a group of patients with general paresis the degree of personality and social adjustment prior to the onset of the disease seemed to be a prognostic factor of primary importance. Symonds[4] expresses this pointedly, in saying

* A paper read before the Montreal Medico-Chirurgical Society, 1944.

From the Verdun Protestant Hospital.

that in a head-injury, it is not only the kind of injury that matters but also the kind of head!

Somewhat disquieting, however, in our case, was the time element. Six weeks had elapsed since the accident and the patient was still delirious. Bonner and Taylor[5] give one year as the patient's average length of stay in hospital in their series of traumatic psychoses without fracture of the skull. While recovery frequently takes place after many months, as time goes on there is the growing threat of some degree of permanent dementia as the final outcome.

Treatment consisted for the first week in bed rest, hydrotherapy and high caloric diet, rich in vitamins especially of the vitamin B complex. During the next week, as the patient was still extremely restless, he was given three injections of pyrifer, each injection producing a rise of temperature to 104°. With the pyrexia he became much quieter and required no further sedatives. There was now some clearing of the sensorium. He recognized his wife, but exhibited a Korsakoff state with loss of memory and orientation, and he frightened her with his confused talk. During the following week the patient received modified insulin therapy. The moderate hypoglycæmia increased his appetite and he gained weight. His Korsakoff syndrome remained unimproved. He could not find his bed when taken to the other end of the room, would urinate on the floor and cry like a child when reprimanded for it by another patient. He still complained of headache.

It was now decided to make a therapeutic trial with large doses of nicotinic acid. The patient was confined to bed and for seven days he received 250 mgm. of nicotinic acid by mouth three times daily and 50 mgm. intravenously once every day. After each dose of the drug, particularly when administered intravenously, there was a marked flushing of the face, neck, thorax, and upper extremities and the patient's headache became worse for about an hour. On the second day of treatment a distinct improvement of his memory was noted. He had never been able to remember the examiner's name for longer than two minutes, no matter how often it was repeated to him, and in spite of the fact that each time he had made almost desperate efforts to recall it. Now he remembered the name for four minutes and could converse rationally for ten minutes without beginning to ramble. On the fourth day of nicotinic acid administration, he was fairly well oriented in the three fields, was able to recall four digits after ten minutes and inquired how he happened to be in the hospital. He had, of course, complete amnesia for the accident. On the seventh day of treatment, he was visited by his wife who had been greatly discouraged for some time over what she judged to be the hopeless mental condition of her husband. A week before, she had left a helpless, crying, childish and confused invalid and now she was greeted by the cheerful, composed and intelligent man whom she had known as her husband. This change taking place within a week after more than two months, with practically no improvement, struck her as almost miraculous.

The nicotinic acid was discontinued after seven days. The patient's convalescence was uneventful and he was discharged from the hospital after another month. For a few weeks there was easy fatigability and impairment of mental concentration. He complained of headache and dizzy spells, and said that his eyes were bothering him when he tried to focus them. He was examined by an ophthalmologist who found no disease. The symptoms disappeared within two months when the patient resumed his work as an accountant. At that time he felt perfectly well. His memory was good. He carried on excellent conversation. The word-association and Rorschach tests were repeated and gave evidence of a well-integrated personality whose intellect and imagery seemed unimpaired.

An important factor in his final rehabilitation was probably the fact that during his illness, his wife had arrived at a financial settlement with the owner of the car which had struck her husband. The patient had no further claims for compensation and was only interested in returning to work. When we heard from him last, one year after the accident, he was working and free from symptoms.

COMMENT

This case is reported because it suggests therapeutic possibilities and also because it seems to offer favourable conditions for an analysis of the therapeutic effect of nicotinic acid.

As to the mechanism of recovery in this case, there is, of course, the possibility that it was spontaneous and only coincident with the administration of nicotinic acid. This is very unlikely. While spontaneous remissions of traumatic psychoses occur frequently, they do not

terminate as abruptly as in our case, once a Korsakoff syndrome has developed, after nine weeks. The patient's consciousness cleared, so to speak, under our eyes and the improvement of his memory could almost be measured with the stop-watch from day to day when nicotinic acid was given.

Assuming, then, that nicotinic acid was mainly responsible for the recovery, two theories exist as to its action in psychoses associated with clouding of the consciousness. Nicotinic acid is one of the vitamins of the vitamin B complex and a necessary factor in the enzyme-co-enzyme system of the brain engaged in the breakdown and utilization of carbohydrates. Cerebral metabolism and oxidative processes in the brain depend on its presence. Its effect in states of nicotinic acid deficiency would be readily understood on this basis. However, in our case there was no evidence whatsoever of deficiency of any of the vitamins previous to or following the trauma. Furthermore, the recovery was so rapid that it can hardly be compared with the ordinary action of vitamins.

Some authors have drawn attention to the pharmacological action of nicotinic acid, which is a powerful vasodilator. It has been suggested that the therapeutic effect of nicotinic acid in certain mental disorders is due to an increased cerebral blood flow, a relative cerebral hyperæmia, which improves the cerebral metabolism. In our case, this seems to be the most plausible explanation. The peripheral vasodilatation following the administration of nicotinic acid is readily visible on the face, neck, chest and extremities. That the "face flush" is accompanied by a "brain flush", has been shown by Aring[6] and others, who found that 40 mgm. of nicotinic acid injected intravenously increase the cerebral blood flow approximately 20% for 20 to 60 minutes. The cerebrospinal fluid pressure rises. Moore[7] has observed dilatation of the pial arteries in cats following the injection of nicotinic acid. Caution is therefore recommended with the use of massive doses of nicotinic acid in conditions associated with increased intracranial pressure and marked arteriosclerosis.

In a recent review of the subject Palmer[8] states: "The traumatic psychoses present an, as yet, inadequately explored clinical field". The textbooks and current literature give few suggestions for therapy of the post-traumatic psychoses, other than "watchful waiting" and conservative management of the patient. Confusional states following head-injury are a definite clinical entity. Their pathological basis has been extensively studied but their treatment has not advanced since Adolf Meyer[9] presented his classification of the mental changes following trauma in 1904. A more active clinical approach appears to be indicated. The administration of nicotinic acid might, in some cases, shorten the course of traumatic psychoses and possibly help to prevent chronic disability.

The author wishes to thank Dr. C. A. Porteous, Medical Superintendent of the Verdun Protestant Hospital for his permission to publish this case.

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DUODENOSCOPIC REMOVAL OF A BOBBIE-PIN THROUGH A GASTROTOMY IN A CHILD 13 MONTHS OLD*

By V. Latraverse, M.D. and Paul M. Ricard, M.D.

Montreal

If we look over the literature, we find that most foreign bodies of the duodenum have been surgically removed. F. P. Silverdale[1] reported a case of a bobbie-pin removed after incision of the fourth part of the duodenum. He points out "there are anatomical reasons why long slender objects are apt to be held up in the duodenum. First, the major portion is retroperitoneal and relatively immobile and is a rather rigid tunnel with a flexible tube, the jejunum, as the exit. It is obvious that a long object would have difficulty in negotiating this curve because of the immobility of the retroperitoneal portion of the duodenum. Another factor is the nature of

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the rugæ in the duodenum and first part of the jejunum; these rugæ are deep and run transversely across the bowel, impeding the progress of the object''.

As the Jacksons[2] have already taught, Silverdale advises to remove slender objects while they are in the stomach either by gastrotomy, by the œsophagoscope or by the catheter method. Raymond[3] and Greely[4] employed the last named instead of the surgical procedure as done by Matriz, Arrigoni, Ferri, Fieschi, Henrard, Chatton, Rivarola, Long, Wallace, Bruce and Lugue whose papers are cited in Silverdale's work. Ombredanne,[5] Veau and Doubrère[6] reported a few cases.

The catheter method may be stated as follows: after abdominal incision, the pin or long and slender foreign body caught in the duodenum is pushed back into the stomach and without opening the stomach, it is threaded into a catheter and withdrawn through the mouth. H. B. Huff[7] used that method in removing a safety pin from the stomach without gastrotomy.

In our case, we used the endoscopic procedure through a gastrotomy with the aid of the surgeon's gentle manipulations which made the endoscopic work easier in spite of the great flaccidity and lack of support of the duodenum.

CASE REPORT

R.M., 13 months old, was brought to the bronchoscopic clinic at Notre Dame Hospital, on October 14, 1943. His mother reported that the child had swallowed a bobbie-pin five days before. A roentgenogram taken by Dr. D. Leonard showed ''the foreign body located rather in the pyloric segment of the stomach than in the pyloro-bulbar portion'' (Fig. 1). The next afternoon, under fluoroscopic guidance, a direct œsophago-gastroscopic attempt of removal made it obvious that the bobbie-pin was present in the second part of the duodenum. Liquid and semisolid diet was prescribed without any medication. Later on, the child was held under weekly medical observation and fluoroscopic control. No change either in the symptomatology or in the position of the foreign body was noticed.

Fig. 1

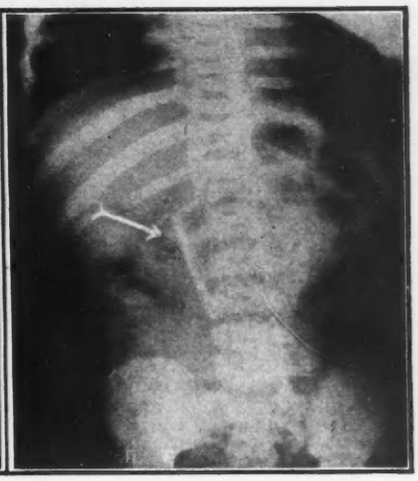

Fig. 2

The little patient was then hospitalized on November 25. The x-ray taken showed the bobbie-pin still in the second portion of the duodenum, the round end down (Fig. 2). A combined surgical and endoscopic removal was proposed.

On December 1 Dr. Paul M. Ricard performed a laparotomy under ether anæsthesia. With his fingers, the surgeon attempted to manipulate the bobbie-pin towards the pylorus into the stomach, expecting its endoscopic removal without doing gastrotomy. He dared not carry on further manipulation on account of the periduodenitis and pericholecystitis existing on the posterior wall of the duodenum and because of the ever-present danger of perforation. Therefore a gastrotomy was performed for it was considered less dangerous than duodenotomy.

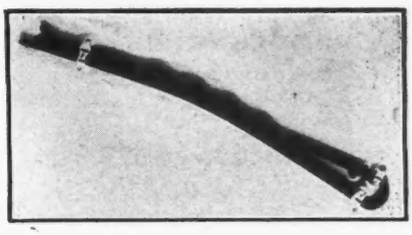

Fig. 3

Through the gastrotomic opening, we introduced the œsophagoscope 5 mm. x 35 cm. into the pyloric hiatus and the duodenum. With the help of the surgeon's fingers which fixed the duodenum and immobilized the foreign body in the lumen of the œsophagoscope, the œsophagoscopist visualized the bobbie-pin among the transverse folds of the deeply inflamed mucous membrane. The foreign body was grasped at

its free branch ends and removed with a side curve grasping forceps (Fig. 3).

The stomach and abdomen were closed, no drain used, with good postoperative recovery. Convalescence was uneventful, and the patient left the hospital on December 10.

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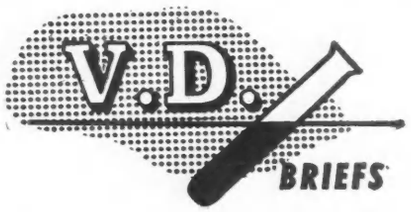
Venereal Disease Campaign



" . . . Yes it Does"—Osler

"But I see an incredulous look on some faces and I hear the whispered comment—'tis heard often enough! 'Where is all this syphilis? It does not come my way'. Yes it does. The syphilis we see, but do not recognize, everywhere awaits diagnosis, so protean are its manifestations."—Sir William Osler's warning to the Medical Society of London, like any unlearned lesson, bears repeating.

Possible Miscarriage of Justice!

"Syphilis!"—A grim sentence to pass on a patient—the hazards of the disease and its treatment—its repercussions on the family group—personal heartache! ! Only the most *convincing evidence* merits a diagnosis of syphilis. *Never* should the diagnosis of syphilis rest on a *single positive blood test!* False positive blood tests do occur! ! !

". . . Treat When in Doubt"—Gonorrhœa in Women

"With the public health in mind it is far better to treat some women who are not infected, than to neglect to treat women whose infection is not obvious but who may serve as a source of infection to others. Any woman who has recently had intercourse with a man known to have gonorrhœa should herself be given treatment regardless of clinical or laboratory findings. Women who are believed or known to practice indiscriminate sexual intercourse are usually infected and had best be treated if leukorrhœa is present. Laboratory evidence in such cases is desirable but not essential for the institution of treatment by the foregoing scheme."—Venereal Disease Information, May, 1943.

"Find V.D. Contacts—Report V.D. Cases"

Editorials

CARDIAC PAIN INSTEAD OF ANGINA PECTORIS

"THERE is a disorder of the breast, marked with strong and peculiar symptoms, considerable for the kind of danger belonging to it and not extremely rare, of which I do not recollect any mention among medical authors. The seat of it and the sense of strangling and anxiety with which it is attended may make it not improperly be called Angina Pectoris. . . ."

These are the first two sentences of the communication[1] in which William Heberden described the clinical syndrome for which he coined the name "angina pectoris" in 1768. He also stated that he had observed "about twenty" cases but had not seen any case examined at autopsy and could only guess at the anatomical pathology related to these symptoms. In the course of time, with the evolution of knowledge about cardiovascular disease, a variety of names appeared. Angina pectoris minor; angina pectoris major; stenocardia; pseudoangina; coronary thrombosis; coronary occlusion; coronary stenosis, and coronary insufficiency, are some of these names, old and new. The term "angina pectoris" has continued to be used in a rather vague manner. While it means "pain in the chest" it has acquired a peculiar significance, namely, the equivalent of a surreptitious, dangerous, killing agency. In a correctly stated modern diagnosis, made in

1. Some Account of a Disorder of the Breast, by William Heberden, M.D., F.R.S., Med. Trans. Coll. of Phys. London, 1872, pp. 59-67.

terms of etiology, anatomical lesion and functional disturbances, the expression "cardiac pain" is accurate and adequate for describing the patient's symptoms; moreover, it can be readily translated into other languages, *e.g.*, *douleur cardiaque* in French. As a name of a disease "angina pectoris" is obsolete and should be eliminated from medical language and writing, and especially from language used in speaking to the patient or his relatives and friends. Only the more rugged or irresponsible personality can escape a significant anxiety neurosis after being labelled "angina pectoris". The cardiac pain of pericarditis, of paroxysmal tachycardia in elderly people, the second-wind phenomenon at all ages, are examples of conditions in which the term angina pectoris might describe the symptoms but would wrongly imply a grave prognosis.

There are various types of cardiac pain and their recognition plays a large rôle in helping to predict the nature of the pathological anatomy and physiology in each case. The familiar syndrome of coronary artery occlusion with myocardial infarction is frequently labelled "coronary thrombosis". Many authors retain the term angina pectoris to describe a case that is characterized by pain which is relieved by rest or nitroglycerine. There remains quite a large group of intermediate types; some of these are said to be suffering from prodromal symptoms of coronary thrombosis; others are labelled "coronary insufficiency" if they present evidence of myocardial infarction without symptoms and signs of coronary thrombosis. The basic meaning of coronary insufficiency is so broad that it must soon lose the specific significance which some try to attribute to it. It seems more reasonable and less confusing to think and speak of chronic, subacute or acute coronary artery disease. "Chronic" should include those who show signs of coronary artery disease with no symptoms, or who have symptoms of a mild character (with or without signs). Colloquially, one could speak about a case of "chronic coronary"; officially, the diagnosis would be stated as follows: Arteriosclerosis, chronic coronary artery disease; cardiac pain on hurried walking. "Subacute" would describe the intermediate types, such as the patient with frequent daily recurrences of cardiac pain on exertion, rather slowly relieved by nitroglycerine, or the patient who begins to experience cardiac pain of relatively short duration, at rest; these syndromes suggest impending coronary artery occlusion and might be due to sudden increase in stenosis. This sometimes results from hæmorrhage into an arteriosclerotic plaque. The diagnosis of a "subacute coronary" would be stated as arteriosclerosis; subacute coronary artery disease; marked stenosis of a large coronary artery; myocardial fibrosis; cardiac pain at rest and during slight exertion. "Acute" coronary artery disease would describe occlusion by an embolus or thrombus or a sufficiently large subintimal hæmorrhage or myocardial infarction resulting from prolonged coronary arterial spasm. For an "acute coronary" the official diagnosis might be arteriosclerosis, acute coronary disease; coronary thrombosis; myocardial infarction; cardiac pain. The terms chronic, subacute, acute, lend themselves very well to colloquial use and thus readily differentiate between the three degrees of severity of coronary artery disease. It is apparent also that a patient suffering from one may develop either or both of the other two types of coronary artery disease.

In the 1942 edition of Standard Nomenclature of Disease[2] the term "anginal syndrome" replaces the obsolete "angina pectoris", which is not given any place in the list of names of diseases or their effects. Thus we are now passing through the period of transition from abandoning "angina pectoris" to adopting "cardiac pain". If physicians will speak of "cardiac pain" this term will soon become official, for such is the growth of language; dictionaries record what the people say.

HAROLD N. SEGALL.

2. Standard Nomenclature of Disease and Standard Nomenclature of Operations, Am. Med. Ass., Chicago, 1942.

Australian rabbits, long a destructive pest, are now heavy contributors to the country's food supply.—*The Diplomate*, 1944, **16**: 241.

THE PROBLEM OF SYPHILIS

SEVERAL reasons are given for the claim that venereal disease is one of our most serious public health problems; the fact that new cases exceed in number most reportable diseases, such as tuberculosis, cancer, diphtheria, typhoid fever, etc.; that some authorities estimate that more than 300,000 Canadians suffer from syphilis; that 75% of all V.D. infections are acquired by the fifteen to thirty-year age group; that its effects strike so deeply not only physically, but socially.

How much do we need to be reminded of these things? Do all medical men fully realize the statistical facts as well as the difficulties that confront efforts at improvement? The work of the V.D. Division of the Army is showing an intensity of purpose deserving of the highest possible praise, but its efforts must be supported not only in the Armed Forces, but also in civilian life. There may be for some people a natural distaste associated with such work, even to the extent of disregarding it, but the threat is too serious to be sidestepped. The most serious thought and effort is being devoted to the control of V.D. in the army, together with a strengthening of the public health services in this field. We cannot afford to spare any effort in assisting this work. The importance of the education of the public can hardly be over-stressed. Take the matter of congenital syphilis for example. A recent report in the *British Journal of Venereal Disease* (1944, **20:** 641) shows that in the city of Glasgow the number of new cases under one year of age which in 1922 was 335, had fallen in 1941 to the gratifying figure of 15. In the following two years under wartime conditions of increased promiscuity the figures rose to 29 and 32. This is an excellent instance of the need for control of syphilis as an infectious disease. The treatment clinic did and is doing magnificent work but this tends to be nullified by the uncontrolled spread of the disease.

Acute Acetone Poisoning — Corrigendum

In Dr. G. F. Strong's article "Acute Acetone Poisoning" in the October issue, page 361, line 41, the blood sugar in error was shown as .38; this should have been .038 (or 38 mgm. per 100 c.c. of blood).

Medical Economics

HEALTH INSURANCE IN CHILE

By Manuel de Viado, M.D.

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and

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INTRODUCTION

During the years following the first world war the wage-earning classes were filled with deep unrest, and the governments were much exercised to deal justly with demands for improvement in the social condition of their peoples. Chile, although it did not suffer directly from the consequences of that war, and despite its apparent distance from the field of battle, did not escape this wave of social reform. Already in 1920, under the influence of Europe, a series of measures was taken to improve the social legislation of the country, whose citizens were beginning to feel conscious of their rights as well as their duties.

Europe had been acquainted with health insurance since the end of the 19th century, but it was only in 1924 that America saw established for the first time on its soil an example of this institution. The honour of introducing health insurance to America belongs to Chile.

Chile was not influenced only by foreign examples in taking this step; it was also impelled by national needs. Among these may be mentioned the country's high morbidity figures, the very limited means of the masses, preventing them from paying individually for medical care, and the existence of a State organization of social assistance which was dispensing medical care as a charity to the sick. In these circumstances there began to take shape a conviction in the social conscience that the workers ought to be entitled to receive medical care not as alms but as of right. It was then realized that the best way of giving effect to this conviction was to use the principle of insurance, already applied in other countries, under which contributions are payable, (*a*) by the employers, in virtue of the benefit they receive from the higher production and due to

the improved health of their workers; (*b*) by the employees, who thereby purchase a legal right to this new social benefit; and (*c*) by the State, which has the obligation of watching over and promoting the welfare of society as a whole.

In September, 1924, political changes hastened the introduction of a number of social measures, among them Act 4054, creating the Compulsory Insurance Fund, to which all manual workers, both men and women, in industry, commerce, agriculture, domestic service, and self-employment were compulsorily affiliated. A parallel development occurred on behalf of all salaried workers in private employment and civil servants, for whom also social insurance institutions were established.

In 1938 an examination of the experience accumulated by these various institutions, together with special medico-social investigations effected in various strata of the population, disclosed that certain diseases were the principal causes of disability and morbidity in the population as a whole and particularly in the classes covered by social insurance. In order to combat these diseases, the Congress passed Act 6174, on preventive medicine.

Without attempting to study in detail how the various funds care for the health of their members, we shall confine ourselves to describing the activity of the more important institutions, namely, health insurance as administered by the Compulsory Insurance Fund for wage-earners and the application of the Preventive Medicine Act by the National Medical Service for Employees.

COMPULSORY INSURANCE FUND

Revenue.—The Fund is financed by a threefold contribution from (1) employers who pay 5% of their wages bill, (2) wage-earners, who pay 2% of their wages, and (3) the State, which pays 1½% of wages. This contribution has to finance not only sickness and medical benefits, including periodical health examinations under Act 6174, and maternity benefits for insured women and wives of insured persons, together with health services for infants up to the age of two, but also benefits in case of invalidity, old age and death.

The insured person's contribution is deducted from his wage by the employer who pays it into the Fund together with his own share. Payment is effected in the form of stamps which are affixed to the insurance book issued, as under the Canadian Unemployment Insurance Scheme, to every insured person, and which are evidence of compliance with the law. Independent workers, both farmers and others, pay the joint contribution themselves, the amount being proportional to their earnings during the previous year. In the case of agricultural workers (and similarly for domestic servants) whose remuneration in kind has to be taken into account, the Fund fixes from time to time, in agreement with the Agricultural Employers' Association and taking account of the cost of living in the various regions, the hypothetical wage on which contributions are to be calculated.

Benefits.—In respect of invalidity, old age and death, cash benefits are payable in proportion to the insured person's period of contribution, while for sickness and maternity, benefits both in cash and in kind are granted.

Since we wish to deal mainly with the medical aspect of health insurance, we may dismiss the cash benefits with only a brief mention. In case of sickness, the insured person receives a cash benefit equal to 100% of his wage during the first week, 50% thereof in the second, and 25% for the next 24 weeks; the maximum period may be extended to 52 weeks in special cases. The maternity cash benefit consists of 50% of the wage during the six weeks before and the six weeks after childbirth, together with a lactation benefit equal to 10% of the wage and payable for one year.

The benefits in kind comprise general and special medical treatment, and surgical, pharmaceutical, dental and hospital care from the first day of sickness for a maximum period of 26 weeks, subject to prolongation to one year in cases recommended by the doctors. The same range of services is available in case of maternity to insured women and the wives of insured men and to the children under two of insured persons.

There exists also a system of periodical health examinations of a compulsory character which will be dealt with below in detail.

Administration.—General responsibility for the administration of the Fund is assigned to a Board comprising three representatives of employers, three of insured persons and one of the Chilean Medical Association, which is the Chilean counterpart of the Canadian Medical Association. The chairman of the Board is the Minister of Health—who, by tradition, is a doctor—while the chief of the State Social Insurance Department, likewise a doctor, is also a member of the Board. Thus, doctors have the same number of representatives on the Board as the employers and the workers. Finally, the doctor in charge of the Fund's medical service attends Board meetings with the right to speak when problems for which he is competent are under discussion.

General organization of medical service.—The medical service is directed by a headquarters, whose chief medical officer not only discharges the administrative functions pertaining to the management of a medical service, but also determines the policy to be followed in the different sections of the service, with a view to the study and solution of the technical problems of the main categories of the national health, to setting standards for the proper application of regulations and to proposing the changes in the regulations in conformity with the fluctuations of morbidity and mortality of the country.

The headquarters is divided into the following sections: regional medical supervision; mothers and infants; venereal diseases; tuberculosis; medicine and surgery; preventive medicine, industrial medicine and invalidity; dentistry; pharmacy; biostatistics; social service (health visitors), and popular health instruction.

Chile is completely centralized for the purposes of legislation, but for those of administration it is divided into provinces. In each province there is a medical director, who represents the headquarters of the medical service.

The Fund furnishes medical care through health centres, which are classified as clinics of first and second-class; third-class clinics; first-aid centres; rural medical posts distributed throughout the country; hospitals, sanatoria, convalescent centres, prophylactic centres and other special establishments.

ORGANIZATION OF HEALTH CENTRES

First-class clinics.—These establishments provide complete care, both general and special, for all kinds of persons, looking not only to the curative but also to the social and preventive, aspects of medicine. They comprise the following services:

1. Preliminary examinations, conducted by a team of doctors (at least one general practitioner and one surgeon), who make the first diagnosis and send the patient to the appropriate specialized service.
2. Domiciliary attendance, urban and rural, which answers urgent calls and furnishes attendance at the home of the patient when he is unable to come to the clinic.
3. Medicine and surgery, subdivided, as may be required, into the specialties of internal medicine and surgery (cardiology, gastro-enterology, endocrinology, etc.).
4. Mothers and infants, responsible both for pre-natal preventive care, obstetrics and pædiatrics, including treatment as well as prevention (vaccination, BCG, immunization, etc.).
5. Venereology, comprising early diagnosis of serological lues, anti-venereal treatment in general and urology.
6. Tuberculosis.
7. Gynæcology.
8. Ophthalmology.
9. Oto-rhino-laryngology.
10. Dermatology.
11. Preventive medicine and industrial medicine.

In addition to these, the principal clinics possess the following ancillary technical services: complete clinical laboratory; radiological cabinet (radioscopy and radiography); physio- and electro-therapy; pharmacy; dentistry; and social service. The following auxiliary administrative services are also provided: information and secretariat; identification and reception of patients; calculation of cash benefit, which is paid at the clinic itself; statistics.

Naturally, these first-class health centres are only to be found in the larger cities which are the centres of attraction for the population. It should be noted that they have no hospital service of their own.

Second-class clinics.—These clinics have somewhat the same administrative services as those of the first class, and possess, besides the general services, those special services which deal with the three principal categories of Chilean health matters, namely, tuberculosis, mothers and infants, and venereal diseases. They possess, therefore, sections for preliminary examinations, domiciliary attendance, medicine and surgery, mothers and infants, tuberculosis and venereal diseases, but not for the other specialties, although they may provide general treatment for patients needing such other specialties, while sending them for the necessary special treatment to first-class clinics which can provide it.

Second-class clinics are established in the smaller cities of the country with less than 10,000 inhabitants. They, again, have no hospital service of their own.

Third-class clinics.—These clinics have the medical (one, two or three doctors) and auxiliary staff necessary in order to meet the local needs of small settlements distant from the great urban centres. Their work is confined to general medical care and the care of mothers and infants. They may contain a number of beds for cases in which hospitalization is urgent, and if so, they are called first-aid centres and have a resident surgical and auxiliary staff. These clinics serve as centres of attraction for the specifically rural work of the Fund.

Rural medical posts.—These posts are situated deep in the rural areas and the remotest regions of the country. They have a medicine chest under the charge of a resident midwife or apothecary. They are visited periodically, (weekly or fortnightly, according to the distance from the nearest clinic and the means of locomotion to be used—automobile, horse, canoe, etc.) by a general practitioner, and occasionally by specialists and dentists.

FUNCTIONING OF HEALTH CENTRES

An insured worker entering one of the big health centres (first or second-class clinics) for the first time, presents himself at the information desk where after verifying his status as an insured person, he is sent on to the identification and statistical desk, where a card is made out with the relevant administrative data (name, registration number, address, etc.) and he is directed to the team of doctors which effects the preliminary examination. The patient takes his card with him for annotation by the doctors who see him. When he makes a subsequent visit, he draws the card again from the identification and statistics desk.

On the first occasion that an insured person comes for the treatment of a particular disease, the team of doctors makes a general clinical examination in order to determine—using x-rays if necessary—to which specialized service the patient should be directed. In the case of later visits for the same disease, the patient goes straight to the specialist who is looking after him. It is the specialist who decides the nature and seriousness of the illness, makes the diagnosis, prescribes the treatment and indicates the likely duration of incapacity for the purpose of the payment of cash benefit.

At the smaller centres where fewer doctors are employed, they agree among themselves what specialized services their pooled knowledge allows them to furnish. Where, in the doctors' opinion, it is necessary to furnish special services not available in the locality (at a rural post, for example), the patient is sent to the nearest town where such services are provided, cash benefit being paid meanwhile and the Fund meeting the travelling expenses. Pharmaceutical prescriptions are made out by the doctor on special forms and are executed by the dispensaries of the Fund's own health centres; only in exceptional cases is the person authorized to have the prescription filled at some local pharmacy with which the Fund has a contract. This happens only in small towns where, by reason of the small number of prescriptions it is not economical for the Fund to maintain its own pharmaceutical service.

Hospitalization.—When a patient needs to be hospitalized the doctor asks the social service of the clinic or, where there is no such service, some other administrative service, for an order for the admittance of the patient to the hospital or one of the hospitals in the locality belonging to the Administration of Public Charities and Social Assistance. The latter is a public authority which owns almost all the hospitals in the country and is one of the main organizational bases of social medicine in Chile.

The Compulsory Insurance Fund has a contract with the Administration of Public Charities whereby the latter agrees to furnish all attendance involved in hospitalization for patients entrusted to it, in return for an amount fixed on the basis of the regional cost per bed per day, to be paid by the Fund.

Once he is in hospital the patient is treated by doctors working for the Administration of Public Charities at the hospital. In the small and middle-sized towns these doctors work both in the hospital of the Administration and in the clinic of the Fund, so that for most patients there exists continuity of treatment through clinic and hospital. In the big towns, however, this is much less likely to occur by reason of the larger number of hospitals and the larger number of doctors who work full time whether in hospitals or in clinics.

SOME STATISTICS

The Compulsory Insurance Fund, the organization and medical service of which has been outlined in previous pages, covers more than a million and a half insured persons, that is to say, about 90% of the working population of the country, according to the last census (November, 1940).

The Fund furnishes medical care through 183 clinics, 519 rural medical posts, and 82 miscellaneous services, in all of which 3,305 persons are employed, of whom 998 are doctors. During 1942 this medical organization provided 2,770,000 medical consultations, 221,500 maternity consultations, 41,225 deliveries, 1,141,500 pædiatric consultations, 389,000 laboratory examinations, 205,000 radiological examinations, 310,000 dental treatments, and 2,635,000 prescriptions.

As an example of the action of the Fund on the health of the population may be mentioned the fact that the Mothers and Infants Service attends to 24% of the total number of births in the country and 28% of infants under the age of two. The infant mortality rate has fallen during the six years this Service has been in operation from 252 per thousand live births in 1936 to 194 in 1942.

To give an idea of the financial scale of the Fund, the latest balance sheet shows that its medical services cost 231,500,000 pesos, including 44,500,000 for hospitalization. Cash benefits, in addition, amounted to 40,000,000 pesos.*

Medical expenses took 53% of the total income of the Fund in 1943, and in the same year that income represented 15% of the national budget (nearly 3,000,000,000 pesos).

PREVENTIVE MEDICINE ACT

Investigations carried out in 1938 show that the social health conditions of Chile had a common denominator made up of tuberculosis, venereal disease, and diseases of the heart and circulatory system. These three diseases accounted for 60% of deaths among the population of working age, 56% of hospital morbidity, and 38% of concealed morbidity among the supposedly healthy.

In order to secure early diagnosis and prevent the development of this group of diseases, and thereby to improve the health of the population and reduce the cost of the medical service, Act 6174 was passed, which makes a periodical medical examination compulsory for all persons affiliated to any social insurance fund, that is to say, 36% of a total population of a little more than 5,000,000.

The essential features of this Act are the following: (1) Periodical, gratuitous and systematic medical examination. (2) Preventive rest, that is, abstention from work where the

*One U.S. dollar equals 25 to 30 pesos.

doctor considers that this is conducive to recovery from tuberculosis, syphilis or heart disease. (3) Payment of a benefit during preventive rest at the same rate as the full wage which the patient was earning; this benefit is continued as long as recovery appears likely, and may be granted either to the patient himself or to his dependents, according to the indications of enquiries made by the Social Service. (4) Right of patient to return to his previous post at the end of the period of preventive rest, and security against dismissal during the six months following his recovery.

In order to finance these benefits, the various insurance funds must set aside 2½% of their gross revenue, while the employer must contribute an additional 1% of wages which is solely devoted to financing the preventive rest benefit.

NATIONAL MEDICAL SERVICE FOR EMPLOYEES

This is the common medical service of all the insurance funds for salaried employees, mercantile marine officers and public officials. It affords an example of an organization designed to carrying out the systematic medical examinations required by Act 6174.

Under the supervision of a medical vice-chairman, there exists a headquarters and 42 medical services in the industrial and mining centres of the country and the principal ports. The headquarters is divided into the following departments: *Control*, with sections for medical economics, vital statistics, etc. *Medical*, with sections for tuberculosis, venereal diseases, heart diseases, etc. *Preventive rest*, with sections for social service, sanatoria, etc. *Dental. Administrative.*

The provincial medical organizations possess, besides the ordinary administrative and ancillary services, special services for the campaigns against tuberculosis, venereal disease, and diseases of the heart and circulatory system.

The insured person presents himself for examination by the National Medical Service for Employees either on his own initiative, or on the instruction of the insurance institution to which he belongs, in order to obtain a benefit, the grant of which is conditional on the production of a medical certificate, or again, on the instruction of his employer, since systematic examinations are also organized industry by industry.

The insured person first completes a medico-social questionnaire adapted to the investigation of the three groups of diseases covered by the Act. There is then taken a blood sample for the application of the Kahn reaction, a sample of urine and an x-ray photograph of the thorax, and an examination is made of the dentition. These procedures are carried out by a staff of properly trained auxiliaries and their results, set forth on a special card, are sent to the doctor who, on the following day, decides in the light of them whether or not a clinical examination of the patient is required.

If the insured person is found to be fit, that is to say, free from the diseases in question, a certificate to that effect is written and the investigation is closed. If, on the contrary, it is confirmed or suspected that the patient is suffering from one of these diseases, he is sent, together with all information on his case, to the specialized service or services concerned (tuberculosis, venereal diseases, heart diseases). The specialist decides, in accordance with standards laid down by a decree of the Minister of Health, the degree of the disease and the treatment required, including preventive rest with continuance of the full wage.

A medical tribunal which is attached to each of the regional services decides according to the medico-social circumstances of the case whether the patient should be sent to one of the sanatoria, marine or high altitude, belonging to the insurance institution, or take his rest at home, in which case the Social Service exercises constant supervision over him and sees that he is examined periodically.

In order to perform medical examinations in rural areas where there are very few employees of the classes covered by the Service and where, in consequence, it is not economical to maintain a permanent medical organization, motorized equipment is used, consisting of a laboratory, radiography apparatus and dark room, an electric generator, a medical staff (tuberculosis specialist, laboratory analyst and a specialist in heart and venereal diseases) and the necessary auxiliary staff.

Some statistics.—In 1942 there were examined, under Act 6174, 136,480 insured persons from the various insurance institutions: 70% were examined by the Preventive Medicine Service of the Compulsory Insurance Fund and the remaining 30% by the National Medical Service for Employees.

Among the wage-earners examined, 22% were found to be suffering from the diseases in question, and among the employees, 36%. Tuberculosis was found in 8.1% of the wage-earners, and 13% among the middle-class employees. Syphilis accounted for another 8.1% of the wage-earners and for 6% of the employees. Diseases of the heart and circulatory system were found in 5.8% of the wage-earners and 17% of the employees.

A total of 51,000,000 pesos was spent for preventive rest benefit during the year. Special enquiries show the encouraging result that 80% of the cases of tuberculosis treated in sanatoria or at home, in accordance with the Act, have recovered.

STATUS OF THE MEDICAL PROFESSION

All the social insurance institutions furnish medical care through a medical staff who serve as officials and are paid salaries in proportion to the number of hours that they work for the institution. Some of these officers, especially heads of departments, sections, and services,

medical inspectors, etc., are employed full time. In order to enter the service of an institution, it is necessary to possess the title of "physician and surgeon", granted by the State university. Osteopaths, chiropractors, etc., are not recognized and, for that matter, do not exist in Chile. As a rule, when there are several candidates for one post, a competition is held on the basis of the knowledge and experience of the candidates.

The medical staff of the social insurance institutions is classified in a scale of rank, to each degree of which corresponds a specified salary. This scale of rank, together with length of service and merit, is taken into account for the purpose of granting increments of salary or filling vacancies in grades above that occupied by the person concerned.

The basic hourly salary rate is increased when the doctor has the responsibility of a chief (chief of service, of clinic, etc.) or when he is assigned to a rural service (mileage allowance), or again, when he works in certain regions of the country. For some specialists also, such as tuberculosis specialists and radiologists, there are special allowances.

Medical work for a social insurance institution is compatible with similar salaried work for another institution (public health, hospital, other insurance institutions) as long as the total daily hours of work do not exceed nine. Private practice is permitted outside the hours of service.

As officials of social insurance institutions, doctors are themselves insured with the institution which is competent for public servants. In this manner they are assured of invalidity, old-age and survivors' pensions and can obtain personal loans and mortgages under the regulations of this institution. In order to maintain the level of professional competence, postgraduate courses are organized from time to time and the insurance institutions arrange, when circumstances permit, for travel abroad for the purposes of postgraduate study.

The doctors of the social insurance institutions belong to the Insurance Doctors' Federation, which is one of the three federations which constitute the Chilean Medical Association. Both the Federation and the Association, at their Congresses, have definitely expressed their support for social insurance, and they collaborate closely with the authorities responsible for its administration with a view to improving and extending the activity of social insurance, but without, of course, neglecting to press for the improvement of the economic status of their members and for the maintenance of the highest standard of efficiency and knowledge in the medical services. It may be said, without exaggeration, that practically all the doctors in Chile today are officials either of the Public Health Department or of the social insurance institutions or of the Administration of Public Charities and Social Assistance (Hospitals).

. . . .

General Application of Health Insurance

The application of health insurance in Chile has met and continues to meet with practical difficulties. So far as the urban population is concerned, these difficulties were mainly of an administrative and organizational order and were fairly quickly overcome. At first, there was some resistance on the part of the workers to the payment of contributions, but once they had witnessed the advantages of health insurance, they gave, and have continued to give, it their fullest support. The doctors likewise were not at first in favour of social insurance and opposed their incorporation into the ranks of public officials. But very soon they became more impressed with the services which insurance so organized can render to a whole population, which thus obtains full medical care at a much lower cost, than with any economic prejudice that their profession might incur.

It is in the rural areas that the difficulties of applying health insurance are most serious and hardest to overcome. They may be classified under three headings: economic and administrative, cultural, and medico-social.

The principal economic difficulties are the low level of the wages of the rural population and the calculation of the wage itself, since a large part of it is paid in kind. As we have already noted, a solution for the latter problem has been reached by means of an agreement with the employers' organization fixing a hypothetical total wage. The evil of low wages is one which lies beyond the power of social insurance to remedy, although health insurance can at least force on the attention of the responsible authorities the fundamental dependence of family health on family income.

The cultural difficulty resides in the difference between the levels of education of the rural and urban populations. Although this is a problem which concerns the nation as a whole, the social insurance institutions in Chile have done what they can to contribute to its solution. They have co-operated with rural education organizations and with rural workers' trade unions, in order to supply rural workers with elementary education and, at the same time, to acquaint them with their rights and duties under the social insurance laws.

The most important problems are of the medico-social order. The rural areas are very thinly populated; housing is bad; the people are underfed; sanitary conditions are defective; and means of communication are inadequate. In these circumstances the Chilean health insurance scheme has tried out various policies. At the outset medical benefit was furnished by doctors following the methods of private practice, and free-

dom of choice was fully respected. Under these conditions no medical care could be provided in the rural areas, since there were no resident doctors and the patient was unable to travel to the nearest centre of population. This system was therefore a failure and was abandoned. Gradually, and with some hesitation, health insurance began to appoint medical officers for semi-rural areas with the responsibility of visiting certain districts. This intermediate stage was, in turn, soon exchanged for the present organization which has been described in this article.

Even so, Chilean doctors are not satisfied and for some years have been advocating—and have even tried out experimentally on more than one occasion—the co-ordination of the three main medical services of the country (Public Health, Administration of Public Charities, and Health Insurance) with the object of ultimately unifying them in a single public medical service.

We hope that the 20 years' experience which Chile has had with various ways of applying health insurance—some successful, others failures—may prove of some utility to those countries which, like Canada, desire to solve, by social means, the difficult problem of supplying complete medical care for the whole population.

Men and Books

DR. WILLIAM GEORGE MacCALLUM*

By Arnold R. Rich, M.D.

Dr. William George MacCallum was born in Dunnville, Ontario, on April 18, 1874. He was the second of four children, having an elder and a younger sister, and a younger brother, John Bruce MacCallum, whose brilliant career in medical research was cut short by his death from tuberculosis at the age of thirty.† His mother, Florence Octavia Eakins, was born in Sparta, Ontario. She was an accomplished pianist and singer, and from her, doubtless, Dr. MacCallum acquired his deep and life-long love of music. His father, George Alexander MacCallum, born in Stouffville, Ontario, was a general practitioner with an active practice in the countryside surrounding Dunnville. Later, he served as medical superintendent of two hospitals for the insane in Ontario. As a youth, Dr. MacCallum often rode with his father on visits to patients, and helped him at times during operations by administering ether, and by "purifying the air of the room" with the Lister carbolic spray.

*Reprinted, with some additions, from a sketch written for the *Archives of Pathology*.

†A biography of this brother, by Archibald Malloch, has been published under the title "Short Years."

(Reprinted by kind permission, from the *Bulletin of the Johns Hopkins Hospital*, 1944, 75:73.)

The elder MacCallum had a consuming interest in natural history. He was an insatiable collector, and the home became filled with stuffed wildcats, foxes, snakes, birds and other animals; with birds' eggs; and with Indian relics. This remarkable collection was later given to Queen's University. When the family moved to New York after Dr. MacCallum had become professor of pathology at Columbia University, his father, than about seventy years of age, became pathologist of the Bronx Zoo and of the Aquarium, and, at the suggestion of the younger MacCallum, he entered upon a study of the worm parasites of captive animals—a subject which he pursued eagerly for many years thereafter, and to which he made numerous contributions. He died in 1936 at the age of 93.

Dr. MacCallum was taught at home until he was nine years of age. He then attended public school, and at the early age of fifteen passed the entrance examinations at the University of Toronto with First Class Honours. He entered the University at sixteen years of age, completing in four years the requirements for the B.A. degree and, in addition, a sufficient number of medical courses to enable him to enter the second year class of the Johns Hopkins Medical School, in the company of the small group who, in the preceding year, had been the first students to be admitted to the newly opened school. At the suggestion of Dr. A. E. Malloch, a friend of Dr. Osler and of the MacCallums, he wrote to Osler asking if he could be admitted to the second year class. Osler replied that admission with advanced standing could not be permitted, as no such precedent existed in the school. Since the school itself had not been in existence long enough to have had a precedent of that sort, young MacCallum ventured to direct further correspondence to Dr. Welch, who was then Dean, and was accepted. In 1897, at the age of twenty-three, he was graduated at the head of his class. After a year spent in a rotating internship in the Johns Hopkins Hospital, he applied, without success, for a place on Osler's staff. Dr. Welch then offered him an assistantship in pathology, which he accepted. He progressed rapidly in rank, becoming associate professor of pathology in 1902. In 1905, he and Dr. Harvey Cushing, planned and supervised the building of the Hunterian Laboratory, and he then initiated a pioneering course in pathological physiology. In 1908 he was made professor of pathological physiology and lecturer in forensic medicine. The following year he succeeded Dr. Prudden as professor of pathology at Columbia University, where he remained until 1917, when he returned to Johns Hopkins to succeed Dr. Welch as Baxley Professor of Pathology.

Dr. MacCallum's interest in scientific investigation early manifested itself. While an undergraduate student at the University of Toronto

he was awarded a gold medal for a paper on worm parasites; and it is significant that one of his most important contributions was made at home during the summer vacation following his graduation from medical school. This was the discovery that the flagellated form of the malarial parasite represents the sperm cell, a fact which provided the key to the solution of the life-cycle of the parasite. Young MacCallum reported his discovery at a medical meeting in Toronto, at which Lord Lister presided. Some years later Sir Ronald Ross said about this discovery by the young medical student: "I have ever since felt disgraced as a man of science!"; for Ross had erroneously interpreted the sperm cell wriggling into the penetrated female cell as being a flagellated spore trying to escape from it.

His next contribution of major importance was published several years later, when he was twenty-eight years of age. This was the demonstration that the lymphatic vessels constitute a closed system with continuous walls, instead of having openings in communication with the tissue spaces, as was widely believed at that time. The far-reaching significance of this fact in relation to the physiology and pathology of the tissue fluids and the lymph, needs no comment. This paper was followed by one in which he clearly demonstrated for the first time the mechanism of absorption of granular materials and red blood cells from the peritoneal cavity.

In 1905, at the age of 31, Dr. MacCallum published the first of the series of his studies which revealed the function of the parathyroid glands. By means of beautifully contrived experiments he and Voegtlin showed that the calcium in the blood is maintained at a normal level by the activity of these minute glands; that an insufficient parathyroid secretion leads to a loss of calcium from the blood; that the normal amount of circulating calcium is necessary to temper the excitability of the motor nerves; that the fatal tetany which results from insufficient parathyroid secretion is due to the diminished calcium content of the blood; and, finally, that the symptoms of tetany can be made to disappear at once by the administration of calcium. This investigation represents one of the most important of the pioneering studies on the functions of the glands of internal secretion.

Another fundamental study, published in 1909 at the age of thirty-five, established the fact that the function of the pancreas in relation to carbohydrate metabolism and diabetes is localized in the islands of Langerhans. This had been suspected from the morphological observations of Opie and others, but had remained unproved and uncertain until Dr. MacCallum showed that when the pancreatic duct is ligated, all of the pancreatic glandular tissue except the islands undergoes atrophy and disappears, but diabetes does not occur. If, however, the remaining film of tissue containing only the islands be extirpated, diabetes follows immediately. The procedure (duct ligation) employed by Dr. MacCallum in order to destroy the acinar tissue while leaving the islands intact was later adopted by Banting and Best in their successful attempt to extract from the islands the anti-diabetic hormone (insulin) which Dr. MacCallum's experiments had shown to be secreted by those cells.

Other contributions to pathological anatomy and physiology, which cannot be outlined here, are contained in his bibliography of one hundred and seventy-three papers, which include biographical sketches and studies in medical history, a subject in which he had an enduring interest. In his superb biography of Dr. W. S. Halsted one can read between the lines much of his own attitude toward science, toward life and toward his fellow-man.

No discussion of his contributions could stop short of the mention of that work which has had so wide an influence throughout the English-speaking world, namely, his "Text-Book of Pathology". This book, which appeared in 1916, was written in a lucid and engaging style, and with an inquiring, critical attitude made sound by a rich personal experience with the subject matter. It was a landmark in the history of textbooks of pathology, for it represented the first attempt to treat the entire subject from the standpoint of etiology. In this book the attempt was made to present the effects that each form of injury, each cause of disease, produce in the whole body, instead of following the traditional method of cataloguing all of the heterogeneous and unrelated injuries that can affect each separate organ. Of course, because of the incomplete state of knowledge, it was impossible to write of all morbid conditions from a strictly etiological standpoint, and compromises had necessarily to be made; but Dr. MacCallum's attempt has been widely regarded as a fundamentally important move in the right direction. The extraordinary success of the book in this country and abroad in the past twenty-eight years during which it has passed through seven editions, attests plainly enough the approval which his method of treatment of the subject aroused.

While at Columbia he played an important rôle in the progressive reform that abolished the political coroner system in New York City, and introduced the much superior system through which the examiner of medico-legal cases must be a skilled pathologist, selected from the civil service list by competitive examination; and in Baltimore he was associated with a similar reform.

In recognition of his scientific attainments he was made a member of the National Academy of Sciences in 1921. He was also an Honorary Fellow of the Royal Society of Medicine, London, 1918; Honorary member, Pathological Society of Great Britain and Ireland, 1940;

Honorary Member, Societas Medicorum Sverana, Stockholm, 1918; Corresponding Member, Societas Regia Medicorum, Budapest, 1938; Honorary Member, Société d'Endocrinologie, Paris, 1939; Hon. D.Sc., University of Toronto, 1927. He was a member of numerous American medical societies but, save for the Association of American Physicians, he rarely attended society meetings.

The last entry in a year-to-year outline of his activities that he kept reads: "1941. War advanced throughout Europe. Have been in Marburg for several days, confusion of pronunciation, etc., also in country for days. Going to Winter Park, Florida." At Winter Park he suffered a stroke that paralyzed the right side, and robbed him of speech. He remained bed-ridden thereafter until his death on February 3, 1944.

Dr. MacCallum's nature was of a complexity that renders it impossible to sketch his personality satisfactorily in a few simple strokes. He was a man of strong likes and dislikes, and contradictory emotional forces were not infrequently at play. He lived simply, though he was very responsive to beautiful and tasteful surroundings, and had a gourmet's appreciation of the pleasures of the table. He had wide cultural interests. He greatly enjoyed good conversation on all manner of subjects save politics and metaphysics, and was a delightful, sparkling and stimulating conversationalist. Though he would converse eagerly for hours with those who could ably cross swords with his keen mind, he would become quickly and profoundly bored with dull or pompous persons, and his boredom on such occasions could be appallingly evident. He had a fine sense of humour which, when properly stirred, would cause him to laugh until tears came. In conversation he was always at his best with a single companion or with one or two intimates, for, in spite of his acquired ease among people, he was basically a shy and sensitive person. His fastidiousness in personal contacts, and his aloofness that bordered at times upon the brusque, were attributable in part to his inherent shyness. "I was never a good mixer", he once said. "I scarcely got to know my classmates at Toronto." He shrank from the familiarity that most men find agreeable, and would actually wince on the rare occasions when some venturesome colleague would call him Bill. It is therefore somewhat anomalous that, through his association with J. L. Nichols, he became one of the founders of the Society of Pithotomists, a medical students' club that is still in active existence. In 1896, in his last year as a medical student, he and Nichols, a classmate, rented a house at 1200 Guilford Avenue. As a housewarming they invited Dr. Welch, Dr. Osler and others of the faculty, and a few friends, and entertained them with a small keg of beer. Everyone had such a good time that the performance was repeated; and shortly thereafter seven classmates joined with MacCallum and Nichols to perpetuate the idea, some of them taking rooms in the house. A club was thus formed, and MacCallum manufactured from the Greek the term "pithotomy" for the periodic operation of opening the keg. He maintained a rather wistful interest in the activities of the club throughout his life, but it was always a distant interest, and he was never seen at the later annual "pithotomies", which eventually became quite elaborate, and which have long been attended by the students and by most of the other members of the medical school faculty.

He remained a bachelor, but he thoroughly appreciated the society of attractive and intelligent women, not a few of whom remained his devoted admirers throughout the years, being drawn to him by his personal charm, his courtly, thoughtful ways, his splendid and artistically sensitive mind and, possibly, in the instances in which their attitude was a motherly one, by their intuitive recognition of his ordinarily concealed shyness. He had a charming and disarming way with children, that immediately won their confidence. He himself possessed a marked degree of filial piety, and his concern over his ageing parents was deep, unremitting, and touching.

Though possessing an excellent physique, he cared nothing for sports, whether as a participant or as a spectator. He was very fond of travel, and his trips to far away lands were usually enlivened by the performance of autopsies on cases with extreme lesions or with diseases unfamiliar in this clime, and by the search for new parasites in tropical animals. He would return laden with notes and interesting pathological material. On his last visit to the Orient he wrote from Singapore in a discouraged vein: "There are none of the wonderful things I used to see. The commercial exploitation of 606 or something like it has ruined the syphilis. There is no malaria. I've done cases of tuberculosis of the lungs, epithelioma of the œsophagus, etc., etc., and I doubt whether I'll have anything worth bringing home. I'm afraid it will be just the same in Rangoon. There are no worm parasites any more either. I've found one hookworm, and before everybody had all these things. But what is the good in coming out here to do autopsies on cases of carcinoma of the stomach and tuberculous peritonitis!" But soon he would be describing vividly the strange landscapes, golden pagodas, and women in bright dresses smoking cheroots of huge size. He took many photographs of the scenes of his travels, and these he would have made into lantern slides on his return to exhibit to small groups of friends, with delightful running comments.

His absorbing interest in pathology was carried into all sorts of situations. He was continually on the alert for evidences of disease

in people upon the streets or in public conveyances. Sometimes he would place a section under his microscope, ask for a diagnosis, and after a discussion of the lesion he would smilingly say: "I saw a curious speck in a filet mignon last week at the Blank's dinner party, and I cut it out and slipped it into my pocket and had a section made." Hostesses who learned of this penchant have confessed to a degree of nervousness during the main dinner course when he was a guest.

He loved science, and his scientific ideals were of the purest. He hated dogmatism and cant in whatever relation, and was, himself, completely free from those blights of the spirit. He was a teacher of great simplicity and charm, and he deeply enjoyed his contacts with the medical students. His relations with most of the members of his staff were not very close. It was as though he hesitated to intrude himself into their activities, for he always seemed pleased when they came into his laboratory to consult him. In their turn, they felt hesitant about intruding upon him. They were given the broadest freedom of action, but this freedom was tempered by the unpremeditated, constant example of his own scientific ideals, his continually enquiring attitude, his freedom from dogmatism, and his devotion to the accurate and meticulous study of the manifestations of disease. The influence of his attitude, which pervaded the department, had an enduring effect upon most of those who became members of his staff, and few have worked in his department who have not acquired, from his example, a deeper appreciation of the pleasures and satisfactions of a free spirit of enquiry, disciplined by a high regard for accuracy of thought and observation.

". . . Of all the professions medicine should surely be the first to be recruited on a vocational basis. Humane service and scientific interest should provide the stimulus, not economic advantage or necessity. If we are to maintain and advance the old ideals of medical practice our young men and women must be encouraged to turn to medicine as a vocation and not in anticipation of any considerable profit or improvement in social status. The whole of our teaching and example must be so ordered as to preserve in their minds the predominant idea of a life of humane and scientific action in return for a reasonable living wage. . . ."—Professor J. A. Ryle, *The Lancet*, January 27, 1940.

Association Notes

Meeting of the Executive Committee

The Executive Committee of the Association held a three-day session in Ottawa on October 22, 23 and 24, with 100% representation of the nine Divisions.

Health Insurance

One whole day was given to a discussion of health insurance. The present situation both in the Federal and Provincial fields was reviewed at length. It will be recalled that the Federal Bill of Health Insurance was reported to the House of Commons by the Social Security Committee before adjournment of the House last summer. It was anticipated that the measure would be discussed in a Dominion-Provincial Conference in the autumn, but it now appears unlikely that such a Dominion-Provincial Conference will be held.

All the major political parties appear to be committed to health insurance in some form or other, and your committee is of the opinion that the subject will engage the attention of the House in the coming year.

In the opinion of your Committee, it is vitally important that the medical profession inform itself of the meaning and implications of health insurance, and it is equally important that the profession should exchange views on the subject with representative groups of the public. With this end in view, it is proposed that conferences be arranged for this winter with representatives of Veterans, Labour, Agriculture, Business, Manufacturers, Women, and such other groups as it may later seem advisable to include. It would appear that, while health insurance legislation is apparently in suspension, it is not by any means dead. The medical profession must continue its program of enlightenment and understanding.

The War

Those members of the Committee who represent the Association on the Canadian Medical Procurement and Assignment Board reported that the work of the Board proceeds satisfactorily. There have been more than 4,000 medical enlistments to date in the three services. There are over 500 potential medical officers finishing their medical education and internship, all of whom will be available for

commissions in the course of the next eighteen months.

REHABILITATION

One of the major problems confronting the Board is rehabilitation. By a questionnaire survey, it has been disclosed that more than 90% of the medical officers now in military service desire postgraduate medical education following demobilization. The requests vary all the way from short refresher courses to prolonged courses leading to specialties. The Board has been appointed advisers on the subject to the Department of Veterans' Affairs. To facilitate and expedite the handling of the problem, the Board has been enlarged by the addition thereto of representatives from the nine medical schools of Canada, the Canadian Hospital Council, and the Royal College of Physicians and Surgeons of Canada. Working in close co-operation with the Board is the Association's Committee on Rehabilitation of which Dr. D. Sclater Lewis of Montreal is Chairman. A survey is now being made of the facilities available in the medical schools and hospitals of Canada for postgraduate study. It is hoped that by the time demobilization of medical officers begins, arrangements will have been completed to meet the needs.

SOLDIERS' DEPENDENTS BOARD OF TRUSTEES

The Committee conferred with the Soldiers' Dependents Board of Trustees. A survey of the nine Divisions had previously disclosed that there is considerable dissatisfaction among the profession with respect to the medical fees being paid by the Board, and some of the methods employed in dealing with the profession. Your Committee, some time since, recommended to the Board as follows:

1. That the Soldiers' Dependents Board of Trustees be requested to use the medical tariffs of the Provincial Divisions of the Canadian Medical Association.
2. That medical men be used as assessing officers, such personnel to be appointed by the Provincial Medical Associations.
3. That cheques in payment of doctors' accounts be forwarded directly to the doctor and not to the patient.
4. That, when an account is not paid in full, explanation be made to the doctor and the patient as to why it is not paid in full.
5. That it would be desirable that there be a doctor appointed to the Central Board, whose opinion would be of value in dealing with medical policy.

At a later date and on the Board's request, the tariffs of the nine Provincial Divisions were submitted to the Board in order that consideration might be given to the compilation of a tariff which would average all the provincial tariffs. The Soldiers' Dependents Board at this meeting advised your committee that they were not prepared to accept the Provincial medical tariffs but urged instead that the profession accept the tariff of the Department of Pensions and National Health, which tariff has been in existence for many years but which, by the way, has never, until recently, been a public document available to the medical profession.

The Board was not disposed to take any steps to have a doctor added to the Central Board or to ask for assessing committees from the Divisions of the C.M.A.

The Board was agreeable to sending the cheques directly to the doctors and explaining why any accounts were not paid in full.

Your Committee urged upon the Board that our recommendations again be reviewed by the Board and adopted.

REORGANIZATION OF THE DEPARTMENT OF PENSIONS AND NATIONAL HEALTH

As announced in the House of Commons and the public press, reorganization of the Department of Pensions and National Health has been effected by the creation of two new departments—

1. The Department of National Health and Welfare with the Honourable Brooke Claxton as Minister;
2. The Department of Veterans' Affairs with the Honourable Ian Mackenzie as Minister.

At the last annual meeting, your Council went on record as favouring medical and hospital care of veterans and all other matters of a Federal health nature being incorporated in the Department of National Health and Welfare. It now appears in the present set-up that all matters pertaining to veterans, including medical and hospital care are to be included in the Veterans' Department.

On the evening of Monday, October 23, the Honourable Brooke Claxton, newly appointed Minister of National Health and Welfare, very graciously entertained the Committee to dinner. Mr. Claxton made it abundantly clear to the Committee that he desired the new Department to be most effective in the health field by performing all of those duties which properly fall within the jurisdiction of the Department. Your Committee assured the Minister that it would be the desire of the Association to render him every support within its power in carrying out his laudable ambition.

MEMBERSHIP

COMPARATIVE STATEMENT FOR THE YEARS 1943 AND 1944

Province	*Paid 1943*	*Paid 1944*	*Unpaid to Oct. 21, 1944*
British Columbia	444	429	65
Alberta	550	550	
Saskatchewan	285	301	16
Manitoba	337	393	26
Ontario	2,378	2,572	69
Quebec	652	690	32
New Brunswick	169	228	
Nova Scotia	263	260	24
Prince Edward Island	39	41	6
Totals	5,157	5,464	288

In Military Service (no fees)	3,579
Grand Total, 1944	9,043
Paid membership in 1939	4,001
Paid membership gain during 5 war years	1,463
Total membership gain during 5 war years	5,042

An examination of the figures discloses that our growth in membership during the past five years has been highly encouraging. During this period we have more than doubled the membership we had when the war began. Some may argue that much of this membership, represented by non-paying members in military service, presents a false picture of strength. On the other hand, it will be noted that our paid membership in 1944 is 1,463 more than in 1939.

NEXT ANNUAL MEETING

After careful consideration it has been decided to hold a full scale convention in Montreal during the week of June 18, 1945. The Mount Royal Hotel has been selected as the place of meeting. Under the chairmanship of the President-Elect, Dr. Léon Gérin-Lajoie, active committees have been established and the work of preparing for the convention is now under way. Council will meet on Monday and Tuesday, June 18 and 19, the scientific program taking place on the three succeeding days.

DIVISIONAL MEETINGS

The President, Dr. Harris McPhedran, accompanied by a team of speakers and the General Secretary, visited the three Eastern and four Western Divisions at their annual meetings in July and September. The President stated that all the meetings were well attended; the programs were of a high order; and the hospitality all that could be desired. He noted that, although something over 35% of the medical profession had gone to war leaving 65% (the older age group) to carry on in civilian practice, the health of the nation as a whole was excellent. The President made reference to the fact that many doctors are carrying on quietly and uncomplainingly although they have passed the age when they might normally be taking life much easier. They are among Canada's war heroes.

THE "OVERSEAS BULLETIN"

To date five issues of the *Overseas Bulletin* have been produced and sent overseas in sufficient quantity for distribution to all Canadian Medical Officers in the Services. These *Bulletins* have aimed particularly at acquainting our colleagues with what is going on in Canada, especially in the field of medical economics. Other *Bulletins* are to follow. The Committee was glad to learn that these *Bulletins* are received with pleasure and satisfaction by our absent members.

DEPARTMENT OF HOSPITAL SERVICE

The Department of Hospital Service of which Dr. Harvey Agnew is Secretary, reported a busy and successful year's program. The hospitals of Canada are carrying on under terrific strain both as to staff and equipment. It is the aim of the Hospital Service Department to assist the hospitals in every possible way.

INDUSTRIAL MEDICINE

The Committee on Industrial Medicine reported that there will shortly be ready for distribution reprints of articles appearing on the subject of industrial medicine in the *Journal.*

COMMITTEE ON PHARMACY

The Committee on Pharmacy reported that its work on the new Formulary is almost completed. It is hoped that arrangements will be made whereby this Formulary will be available to the entire medical profession of Canada.

MEDICAL TRAINING CENTRE IN CAMP BORDEN

Dr. F. A. Brockenshire reported that the special committee of which he was chairman had spent $2,500 in furnishing the officers' lounge room in the Royal Canadian Army Medical Corps Officers' Training Centre in Camp Borden, the funds having been provided by the Canadian Medical Association and the Ontario and Nova Scotia Divisions.

Ownership of the furniture is vested in the donors who will determine its disposition when the war is over.

CONCLUSION

There were many other items dealt with, several of which were referred to the various Divisions for study and report.

T. C. ROUTLEY,
General Secretary.

Divisions of the Association

Alberta Division

The annual meeting was held at the Macdonald Hotel, Edmonton, on September 20, 21 and 22, 1944. Dr. J. Lester Clarke of Didsbury, President of our Division, was Chairman.

The representatives from the Canadian Medical Association were Dr. H. McPhedran, President of the Canadian Medical Association, Dr. W. Magner of St. Michael's Hospital, Toronto, Dr. G. H. Stevenson of the Ontario Hospital, London, Dr. Albert Ross, Montreal, and Dr. T. C. Routley, Toronto, General Secretary of the Canadian Medical Association. These guest speakers together with Dr. J. H. Brown, D.Sc., of the University of Alberta, Captain C. G. Sheps, R.C.A.M.C., of M.D. 13, Calgary; Captain Melick of the United States Army Station Hospital, Edmonton, and Captain F. E. Saunders, R.C.A.M.C., M.D. 13, Calgary, contributed in great measure to the success of the meeting.

The report of the cancer committee of the Canadian Medical Association, Alberta Division, was submitted and the proposal made that there should be formed a federal department of cancer research in connection with the National Research Council, as at present there is no nationally directed cancer research in progress, though certain private investigations are being conducted. It should be the duty of a national director of cancer research to enquire into all alleged private cancer cures for the purpose of determining the value of the research and "if worthy of national support and direction, such support should be arranged. If the private research has no grounds for help, such decision should be made known. It is the recommendation of the Cancer Committee that any person who has ideas about the cause and cure of cancer should submit these suggestions to the Minister of Health for Canada." Concerning the situation in Alberta, the Cancer Committee recommends that an institution should be built for the care of cancer patients who require special attention following surgical, radium and x-ray treatments, particularly where such care cannot be secured satisfactorily at home. The report of Dr. G. R. Johnson, Secretary of the Canadian Medical Association, Alberta Division, dealt with the operation of cancer clinics, soldiers' dependents, rehabilitation, Procurement and Assignment Board, Alberta Liquor Control Board, public health work, maternity hospitalization, medical health units and public health insurance.

At the annual banquet held at the Macdonald Hotel, Lieut. Colonel K. A. Hamilton of the Loyal Edmonton Regiment, was the guest speaker.

At this gathering, Dr. H. McPhedran of Toronto installed Dr. H. H. Hepburn of Edmonton as President of the Alberta Division for the coming year, who had been elected at the annual meeting. Dr. H. N. Jennings of Calgary was chosen President-elect. Other officers elected were Dr. H. C. Jamieson, Edmonton, librarian, Dr. G. R. Johnson, Calgary, Secretary-treasurer.

At a meeting of the Medical Alumni Association of the University of Alberta, Dr. A. C. Rankin was elected Honorary President, Dr. Percy Sprague of Edmonton, President, Dr. A. C. McGugan, Vice-President, Dr. N. E. Alexander, Secretary, and Dr. F. Low, Treasurer.

G. E. LEARMONTH.

British Columbia

The annual meeting of the Canadian Medical Association, British Columbia Division, held in Victoria was a very successful one. The attendance was remarkable considering the times, over 270 having registered, whilst many others attended for a brief period.

The annual dinner was held on September 29 and the guest speaker was Dr. Norman A. MacKenzie, the new president of the University of British Columbia. He made a deep impression by his very excellent address. We feel that the University of British Columbia is to be congratulated upon its new president.

The following officers were elected for the year 1944-45: *President*—Dr. G. O. Matthews, Vancouver; *First Vice-president*—Dr. A. H. Meneely, Nanaimo; *Second Vice-president*—Dr. Ethlyn Trapp, Vancouver; *Honorary Secretary-Treasurer*—Dr. S. G. Baldwin, Vancouver.

The question of a medical school for the Province of British Columbia is beginning to be a very live one, and the Committee appointed by the British Columbia Medical Association to study this question headed by Dr. K. D. Panton, of Vancouver, has done excellent work, and its report presented at the annual meeting shows considerable progress. There is no doubt of the urgent necessity for a medical school in British Columbia. Vancouver, where it will certainly be located, is now a city of considerable size, and should be able to support a first rate medical school. Clinical material is abundant, and the hospitals, which would be utilized in the event of the establishment of a medical school, are well equipped and quite adequate. Unfortunately, the University of British Columbia is financially in a state of chronic starvation, and the establishment of a new faculty presents many problems, which will be difficult to surmount. There is no doubt that the authorities of the University are in sympathy with the idea, but there is a woeful lack of public information upon the subject, and it is felt by many that some sort of campaign of public education will be necessary in the near future.

J. H. MACDERMOT

Quebec

The Quebec Division of the Canadian Medical Association is to hold its annual meeting in Montreal on January 26 and 27, 1945.

The program will take the form of clinical meetings at both French and English hospitals; namely, the Hôtel Dieu and Notre Dame, and Royal Victoria Hospital and Montreal General Hospital. In addition, there will be meetings at which special addresses in both languages will be given and discussions held on various questions.

An unusually good meeting is anticipated. All members of the profession in the Province are invited to attend. The full program will appear in the January issue, but a tentative outline is as follows:

MORNING SESSIONS

Friday, January 26.—Hôtel Dieu, *Medicine;* Montreal General Hospital, *Surgery.*

Saturday, January 27.—Notre Dame Hospital, *Surgery;* Royal Victoria Hospital, *Medicine.*

These sessions will include the demonstration and discussion of interesting clinical cases.

The hospitals have kindly offered to provide buffet luncheons each day, at the close of the morning session.

AFTERNOON SESSIONS

These will be held in the Engineering Institute, 2050 Mansfield Street.

On Friday there will be a series of five papers on medical, surgical, obstetrical, gynæcological and pædiatric subjects.

On Saturday afternoon there will be a discussion of various aspects of Health Insurance, in which four speakers will take part, including Dr. Harris McPhedran, President of the Canadian Medical Association.

This is the first time that the Quebec Division has held a mid-winter meeting. It is expected to be of unusual interest and it is hoped that there will be a good attendance.

Medical Societies

Alberta Public Health Association

The annual meeting of the Alberta Public Health Association was held in Calgary at the Palliser Hotel on October 2 and 3. Dr. W. H. Hill, D.P.H. and M.O.H., of Calgary, presided. Addresses were given by Dr. A. E. Archer of Lamont, past-president of the Canadian Medical Association on "Health Insurance". Dr. L. Somerville, Edmonton, director of communicable diseases control on "Health Insurance in Relation to Public Health;" Dr. A. H. Baker, Superintendent of the Central Alberta Sanatorium on "Tuberculosis". Dr. E. P. Scarlett, F.R.C.P.(C) was the guest speaker at the annual banquet. He chose as the text of his address "The dogs bark but the caravan moves on", in which he made a survey of population curves and brought to light interesting statistics of the civilization of Western, of European and of Oriental countries. He remarked that "a reduction of economic burdens of parenthood; lessening of individual tendencies of the modern era, and an adjustment of women's continued rôle in a world outside the home, were necessary factors in constituting a remedy for the declining birthrate of Canada."

Seven new public health units will be added to the nine already in operation in Alberta. These will be in the school divisions of Rocky Mountain House, Athabasca, Wheatley at Strathmore, Brooks, McLeod, Pembina and McLennan in the Spirit River district.

The Canadian Physiological Society

The eighth annual meeting of the Canadian Physiological Society, postponed in 1942, was held at Queen's University, Kingston, Ontario, on October 13 and 14, 1944.

The Council for 1944-45 was elected as follows: *President*, Professor B. P. Babkin, McGill University; *Secretary*, Professor R. G. Sinclair, Queen's University; *Treasurer*, Professor E. M. Watson, University of Western Ontario; *Councillors*, Professors L.-P. Dugal, Université de Montréal; E. W. McHenry, University of Toronto; M. K. McPhail, Dalhousie University; V. H. K. Moorhouse, Medical College, Winnipeg; D. L. Thomson, McGill University; R. A. Waud, University of Western Ontario.

Sixteen new members were elected, making a total membership of 272.

At the two scientific sessions on October 14, the following papers were read.

SOURCES OF ERROR IN DIETARY SURVEYS.—Helen P. Ferguson (by invitation), J. Garland (by invitation) and E. W. McHenry, School of Hygiene, University of Toronto.

As part of a study of errors likely to be found in most dietary surveys, an investigation has been made of the validity of records of food consumption for one week as a basis for the nutritional assessment of food habits. In the group of subjects studied, records for one week only were found to give misleading information.

CONDITIONS UNDER WHICH THE EPITHELIAL CELLS OF THE GASTRIC MUCOSA ARE SHED AND DISINTEGRATE.—Rhoda Grant, Department of Physiology, McGill University, Montreal.

Experiments on the cat which have shown that substances ordinarily in the stomach, *i.e.* meat, bread, and alcohol of weak or moderate strengths, cause the surface of the epithelial cells to be shed, will be described. Evidence consists of the microscopic identification of the cells in the secretion, the reduction in acidity of the secretion first obtained after the substances had been in contact with the mucosa compared to that found before or later in the experiment, and the increase in the calcium content of the secretion. Study of the disintegration changes which the cells undergo in an acid medium such as is

found after the weakest alcohol and after the food substances, permitted their identification to be made without difficulty even when only the nuclei remained. Photomicrographs of progressive disintegration changes will be shown. Other experiments in which it was found that denervation of the stomach abolished or reduced the acid secretion caused ordinarily by some of the substances used, will also be described. Abolition of the acid component of the secretion was sought in order to avoid the possibility that the extent of epithelial cell loss might be masked by this factor.

THE RATE OF REPLACEMENT AND THE SOURCE OF THE REPLACING CELLS OF THE GASTRIC EPITHELIUM.—Rhoda Grant, Department of Physiology, McGill University, Montreal.

A rapid replacement of gastric epithelial cells lost as a result of exposure of the mucosa to 50-60% ethyl alcohol for five minutes or to 1% acetic acid for one-half hour has been observed in the cat's stomach. It was evident to varying degrees in samples of mucosa taken one to five hours after the loss of the cells. This is much faster than the rate previous investigators have reported for the regeneration of gastric epithelium but in their studies the underlying gland cells as well as the surface epithelium had been destroyed by deep lesions similar to those seen in pathological conditions and under these conditions the numbers of replacing cells available would be comparatively few. The photomicrograph slides which will be shown will include some which have been interpreted as showing that the replacing cell is the parietal cell in the neck of the gland.

GASTRO-DUODENAL MOTILITY PHASES AND THEIR RELATION TO DUODENAL ULCER DISTRESS IN MAN.—T. L. Patterson and D. J. Sandweiss (by invitation), Department of Physiology, Wayne University College of Medicine, and Harper Hospital, Detroit, Michigan.

Motility studies on the normal human stomach and duodenum recorded synchronously by the dual balloon bromoform manometer kymograph method, the location of the balloons being determined by fluoroscopic examination, have shown conclusively the existence of four distinct gastro-duodenal phases, namely:

1. Simultaneous gastric and duodenal motility.
2. Duodenal motility with a quiescent stomach.
3. Simultaneous gastric and duodenal quiescence.
4. Gastric motility with a quiescent duodenum.

An analysis of the results indicated conclusively that hunger sensations occur only during the first two of the four gastro-duodenal phases, namely when both the stomach and duodenum are exhibiting motility, and when the duodenum alone is exhibiting motility.

In this report similar studies are presented on patients with active duodenal ulcer, in an effort to correlate ulcer distress in relation with these four phases of gastro-duodenal motility. These gastro-duodenal phases are present in both the normal and in duodenal ulcer patients with certain variations appearing in the duodenal motility as compared to that of the gastric motility. Twenty-one synchronous gastro-duodenal motility studies are presented on four patients with duodenal ulcer, in all approximately seventy-five hours of actual synchronous motility recordings.

An electric signalling device operated by the patients made it possible to record not only the occurrence but the actual duration of the ulcer distress periods showing the synchronous relationship with the motility of the stomach and duodenum. Our results have shown unequivocally that the ulcer distress periods fall only in the first and second gastro-duodenal motility phases as listed above, which is in confirmation with the same phases in which the normal hunger sensations fall.

In conclusion, we feel that the results obtained from this study may find a practical application in giving us a better understanding of the relationship existing between gastro-duodenal motility phases and the symptoms associated with duodenal ulcer in the human. At least, such observations should focus attention on duodenal motility as a factor in its relation to ulcer distress.

VIABILITY OF PRESERVED ERYTHROCYTES. — Dorothy E. Osborne (by invitation) and O. F. Denstedt, Department of Biochemistry, McGill University, Montreal.

Fresh red cells, after transfusion, disappear from the recipient's circulation at a fairly regular rate and are completely eliminated within 100 to 125 days, *i.e.*, at a rate of about 1% per day. Preserved red cells, on the other hand, undergo a partial and fairly rapid elimination during the 24 hours after transfusion, amounting to about 1% per day of storage, and a subsequent disappearance at the rate of about 1% per day, as in the case of fresh cells. This is true especially of blood stored in citrate-dextrose preservative solution at 4-6° C. It appears, therefore, that cells stored under these conditions undergo the same rate of ageing as they do in the circulation.

The addition of a small amount of phosphate improves the preservative value of citrate-dextrose mixtures. On transfusion of the preserved cells the proportion of cells removed from the circulation during the first 24 hours is considerably less than in the case of citrate-dextrose alone.

ALIMENTARY LIPÆMIA AND HEPARIN.—C. B. Weld, Department of Physiology, Dalhousie University, Halifax.

The observation of Hahn* that alimentary lipæmia in dogs is cleared within a minute or so by heparin is confirmed. The visual opacity of the lipæmic plasma is promptly removed by intravenous heparin in dogs, cats, rabbits and humans. Heparin has no such effect on lipæmia *in vitro*.

Measuring the opacity of the plasma with a photoelectric colorimeter and determining roughly the total fat by alcohol-ether extraction, some degree of parallelism between opacity and total fat is revealed. However it is not close and the opacity of the plasma may clear with no change or even with an increase in the fat content.

In attempting to determine the site of action of the heparin, lipæmic blood has been drawn, heparin added and then perfused or circulated through parts of the same animal. It has been perfused (*a*) through the leg from femoral artery to vein, (*b*) through the excised liver from portal vein to hepatic veins. It has been injected intravenously into the circulating blood of anæsthetized cats, (*c*) whose hepatic artery, portal vein and mesenteric arteries have been clamped, (*d*) whose dorsal aorta has been clamped just below the diaphragm, (*e*) whose dorsal aorta and brachial arteries have been clamped, and also (*f*) into a decerebrate cat with a clamped dorsal aorta. In all these preparations at least some degree of clearing of the lipæmia is evident. It would seem that no single organ is responsible for the clearing of the lipæmia, the effect being widespread through the tissues; perhaps the liver clears a little more completely and consistently than the other preparations but the difference is too small to be more than suggestive.

SULFONAMIDES IN BLOOD AND RESPIRATORY TRACT FLUID.—Eldon M. Boyd and J. A. Stewart Dorrance (by invitation), Department of Pharmacology, Queen's University, Kingston.

Investigation has shown that the concentration of sulfonamides in respiratory tract fluid is in direct proportion to that in blood. The sulfonamide is present in the respiratory tract fluid chiefly in free form.

Science, July 2, 1943, 19.

FURTHER OBSERVATIONS ON THE POTENTIATION OF INSULIN BY SULFONES.—A. Bruce Macallum and Christian Sivertz (by invitation), Departments of Biochemistry and Chemistry, University of Western Ontario, London.

Continuation of the work previously reported* has demonstrated the necessity of a dietary factor for eliciting the synergism between sulfones and insulin. This element is found in fresh green vegetables, especially cabbage. When absent the sensitizing effect is minimized and apparent only with maximum dosage of insulin.

List of other papers read but not abstracted were:

CHOLINE AND THE PREVENTION OF HÆMORRHAGIC KIDNEYS IN THE RAT; AMOUNTS OF WATER, NITROGEN, FAT, AND CHOLINE IN LIVERS AND KIDNEYS.—Jean M. Patterson (by invitation) and E. W. McHenry, University of Toronto.

THE PHOSPHOLIPASE OF THE VENOM OF THE WATER MOCCASIN (*Agkistrodon piscivorus L.*).—Donald Fairbairn (introduced by R. G. Sinclair), University of Rochester.

LYSOLECITHIN AND THE ANTIHÆMOLYTIC VALUE OF THE BLOOD.—H. B. Collier and K. M. Wilbur (by invitation), Dalhousie University.

FACTORS AFFECTING THE DEVELOPMENT OF RESISTANCE TO TRAUMATIC SHOCK IN THE RAT.—C. Gwendoline Toby and R. L. Noble, McGill University.

RESPIRATORY QUOTIENTS OF EXPIRED AND ALVEOLAR AIR AT GROUND LEVEL AND REDUCED BAROMETRIC PRESSURES.—J. K. W. Ferguson and L. P. Dugal, R.C.A.F. Medical Branch, and University of Montreal.

THE EFFECT OF TEMPERATURE ON THE RESPONSE OF FISH TO ELECTRICAL STIMULATION.—Grace Workman Scott (by invitation) and K. C. Fisher, University of Toronto.

SOME ASPECTS OF THE METABOLISM OF ARGININE.—H. L. Williams, University of Western Ontario.

EFFECT OF REPEATED ADMINISTRATION OF POSTERIOR PITUITARY EXTRACT ON PITUITARY-KIDNEY RELATIONSHIP IN THE DOG.—G. H. Ettinger and Margaret E. Sawyer, Queen's University.

MESURE DE LA PROFONDEUR ET DE LA DURÉE DE L'ANESTHÉSIE.—Monique Girouard (par l'invitation) et Eugène Robillard, Université de Montréal.

EFFECT OF PITUITARY ANTERIOR LOBE PREPARATIONS ON THE ACTION OF ANÆSTHETICS.—H. Selye and G. Masson, McGill University.

THE STRUCTURE OF PREGNANEDIOL GLUCURONIDE FROM HUMAN PREGNANCY URINE.—R. D. H. Heard, M. M. Hoffman (by invitation), and G. E. Mack (by invitation, Dalhousie University and University Clinic, Royal Victoria Hospital, Montreal.

*Proceedings Canadian Physiological Society, 1942.

PHARMACOLOGICAL ACTIVITIES OF Δ^5-PREGNENOLONE AND ITS ESTERS.—G. Masson, McGill University.

STUDIES ON THE PRODUCTION OF PENICILLIN IN SUBMERGED CULTURE.—S. Siminovitch and F. S. Thatcher (introduced by W. D. McFarlane), Macdonald College, P.Q.

THE EFFECTS OF SULFATHIAZOLE AND OF PROPYL CARBAMATE ON THE GROWTH AND OXYGEN CONSUMPTION OF *B. Coli*.—Florence H. Armstrong (by invitation) and K. C. Fisher, University of Toronto.

THE RESPIRATORY CHARACTERISTICS OF YEAST IN VARIOUS CONCENTRATIONS OF GLUCOSE.—J. G. Aldous (by invitation) and K. C. Fisher, University of Toronto.

No. 24 Canadian General Hospital Medical Society

The most recent overseas Canadian medical group to be formed is the No. 24 Canadian General Hospital Medical Society. We have received notification of this under date of September 30, from Captain John J. Carroll, Secretary.

La Société de Chirurgie de Montréal

Le mercredi, 25 octobre 1944, séance de la Société de Chirurgie de Montréal était tenue sous la présidence du docteur A. Bellerose, au Cercle Universitaire de Montréal.

TRAVAIL SCIENTIFIQUE: APPENDICITE AIGUE ET PÉNICILLINE. Pierre Smith.

Il s'agit d'un cas d'abcès appendiculaire dont les complications post-opératoires semblent avoir été améliorées par la pénicilline.

J.-J. L. . . ., âgé de 18 ans, entre à l'hôpital au début de septembre dernier. Il souffre d'appendicite chronique depuis un an. Dans les derniers quinze jours, il présente des symptômes appendiculaires aigus méconnus par deux consultants.

Opéré d'urgence, on trouve un abcès appendiculaire avec appendice gangréné et coprolithe. En cours d'opération le grêle est contaminé par le pus de l'abcès et les jours suivants, le malade présente un iléus paralytique toxi-infectieux qui nécessite une fistule sur le grêle. L'état péritonitique restant alarmant, on administre par voie intra-veineuse et pendant quatre jours consécutifs, des injections de pénicilline dont le total se chiffre à 190,000 unités. Amélioration rapide et notable des symptômes locaux et généraux. Une vingtaine de jours plus tard, incision d'un abcès pariétal, juxta-ombilical, issu du foyer appendiculaire. Une semaine plus tard, apparaît une phlébite de la jambe gauche. Dès l'apparition de la phlébite, on administre pendant deux jours un total de 60,000 unités de pénicilline. La phlébite semble évoluer vers la guérison plus rapidement que les phlébites traitées par les thérapeutiques courantes. Le malade se lève quatorze jours après le début de la phlébite et quitte l'hôpital huit jours plus tard. En résumé, deux complications post-opératoires d'une appendicite aiguë abcédée et gangrénée semblent avoir été heureusement influencées par les injections de pénicilline.

J.-ERNEST CABANA, M.D.,
Secrétaire annuel.

La société médicale des hôpitaux universitaires de Québec

Séance à l'Hôtel-Dieu tenue octobre 6 à 8 h. 30 du soir.

LES FURONCLES DE LA FACE: LEUR PRONOSTIC ET TRAITEMENT.—J. Grandbois.

Quel que soit le siège du furoncle, l'agent causal et les causes prédisposantes demeurent les mêmes, mais le pronostic devient beaucoup plus sérieux si la lésion fait son apparition dans la région faciale. Cette région dans son ensemble, est plus vulnérable, mais pour des raisons tant anatomiques que physiologiques, la lèvre supérieure et le nez doivent être considérés très particulièrement comme la "Zone dangereuse". Celle-ci est comprise dans un triangle qui s'étend des angles de la bouche à la racine du nez.

Huit cas de furoncles et un cas d'anthrax de la face sont rapportés. Sur ce nombre, sept patients étaient affligés d'un furoncle dans la zone dangereuse. La roëngenthérapie demeure le meilleur traitement de ces infections, et la pénicilline se montrera sans doute un adjuvant très précieux dans les cas graves. Le pronostic des furoncles de la face est en effet toujours sérieux et il faut éviter à tout prix de les traumatiser.

Le travail se termine par les conclusions suivantes: 1°) Le furoncle de la face doit la gravité de son pronostic à des raisons anatomiques et physiologiques. 2°) Les statistiques de plusieurs auteurs très sérieux démontrent que le taux de mortalité varie de 10 à 90%. 3°) Les neuf observations de patients affligés de furoncles de la face, apportent une nouvelle preuve de la sévérité de cette affection. L'un d'entre eux avec un furoncle du nez, compliqué de septicémie et de méningite, est mort quelques heures après son admission à l'hôpital. 4°) Le traitement des furoncles de la face doit être un traitement conservateur. 5°) La roëngenthérapie est le traitement conservateur le plus favorable dans les furoncles de la face et plus particulièrement dans les furoncles de la zone dangereuse.

SYMPATHECTOMIE PRÉSACRÉ DANS LE TRAITEMENT DE LA DYSMÉNORRHÉE.—E. Samson.

Parmi tous les procédés chirurgicaux employés pour traiter la dysménorrhée fonctionnelle rebelle, la résection du plexus hypogastrique supérieur ou sympathectomie du nerf présacré a fait l'objet de plusieurs publications très intéressantes. C'est une des interventions sympathiques les plus répandues et en même temps une des plus efficaces. Cotte de Lyon en a précisé la technique en 1924.

Le plexus hypogastrique supérieur est formé de rameaux nerveux provenant du sympathique lombaire et du plexus solaire. La sympathectomie présacrée, seule ou combinée avec d'autres procédés, fut pratiquée dans 17 cas; nous avons obtenu de bons résultats dans 10 cas, l'opération fut satisfaisante dans 2 cas et nulle dans 5. C'est donc une opération qu'il est bon de pratiquer mais à bon escient et seulement après avoir tenté un traitement médical sérieux et bien suivi.

UTERUS DOUBLE ET GROSSESSE GEMELLAIRE.—J. Caouette.

C. rapporte l'observation d'une femme présentant un uterus double avec grossesse simultanée développée dans chacune des cavités utérines. Cette grossesse a évolué sans incident jusqu'á son terme normal.

Madame L.D., 31 ans, est une femme bien conformée qui ne présente rien à noter du côté de ses antécédents héréditaires ou personnels. Née de parents robustes, elle fait partie d'une famille de treize enfants, tous vivants et en bonne santé. Pubère à l'âge de 12 ans. ses menstruations apparaissent tous les 30 jours avec une durée de 3 à 4 jours. Mariée à 29 ans, elle a conduit heureusement à terme deux grossesses très rapprochées: une simple, l'autre gemellaire. Son premier enfant est né le 24 janvier 1943.

De nouveau enceinte dès le début d'avril de la même année, elle donne naissance à sa première jumelle chez-elle le 20 décembre les suites de couche sont normales et elle se lève le 9e jour. Le 4 janvier 1944, un nouveau travail se déclare (15 jours après la naissance du premier fœtus).

Une opération césarienne est pratiquée d'urgence pour que l'uterus gauche en sub-involution, reste enclavé dans l'excavation agissant comme une tumeur grævia, et empêche la descente de l'extrémité céphalique. L'indication opératoire est posée par une menace de rupture utérine.

La laparotomie permet d'obtenir une deuxième fille vivante et de faire un diagnostic précis de duplicité utérine. La malade était porteuse de deux utérus complètement distincts, situés l'un près de l'autre. Aufond de chacun des deux uterus, sur leur côté externe, l'on trouve une trompe et un ovaire. Les deux uterus étaient très bien conformés et susceptibles de devenir gravides.

Le toucher vaginal pratiqué quelques jours après l'opération a permis de constater la présence d'une cloison verticale divisant le vagin en deux conduits juxtaposés et au fond de chacun d'eux un col utérin bien conformé.

Cette observation nous fait voir que dans les cas de duplicité uréto-vaginal, le diagnostic n'est fait le plus souvent, qu'à l'occasion d'une complication survenant à l'âge de la puberté, au cours d'une grossesse ou au moment d'un accouchement dystorique et que seule une laparotomie permet de poser diagnostic exact de la malformation génitale et des diverses modalités qu'elle peut présenter.

SARCOMES DEVELOPPÉS AU DÉPENS DE LA SYNOVIALE.—Jean-Ls. Petitclerc.

Ces tumeurs sont apparemment peu fréquentes, puisque le docteur Moretz de Rochester, New-York, dans un récent article de *Surgery, Gynecology and Obstetrics* (août 1944) où il rapporte quatre nouveaux cas, n'en a trouvé dans touts la littérature médicale des Etats-Unis qu'une compilation totale de 78 cas. Ces tumeurs se rencontrent le plus fréquemment entre 20 et 40 ans. On en a trouvées chez des jeunes de 9 mois et des vieux de 75 ans. Dans 50% des cas, la tumeur siège au genou; on la trouve fréquemment au coude, à la cheville, au pied, à la paume de la main. Dans 95% des cas, on trouve une tumeur appréciable et dans 50% des cas, la douleur est le symptôme important. Le pronostic en est nettement défavorable. Dans la statistique de Lazarus et Marks, 56.6% des cas ont rapidement récidivé et donné des métastases. Le traitement consiste dans l'exérèse large ou l'amputation. Ewing recommande l'irradiation. Une grosse difficulté c'est que le diagnostic n'est jamais soupçonné avant l'intervention.

Madame G., 48 ans, opérée en mars dernier, pour un soi-disant kyste synovial, sur le dos du pied gauche. Monsieur M., 54 ans, opéré en juillet, pour une troisième récidive d'un kyste du genou gauche. Madame C., 53 ans, opérée en septembre, pour un soi-disant hématome consécutif à rupture de varice. Ces trois patients ont présenté, au moment de l'intervention, des tumeurs à contenu ressemblant à de la substance cérébrale, plus ou moins grisâtre, qui a permis au moins de soupçonner qu'il s'agissait de sarcomes. Monsieur le professeur Berger, qui a examiné les pièces, a fait rapport dans le cas de M. G.: "Le prélèvement est complètement envahi par un sarcome généralement indifférent mais qui présente par endroit une structure rendant une origine synoviale très probable". Dans le cas de Monsieur M., "il s'agit d'un sarcome, en partie très indifférent, mais le plus souvent nettement mucipare et partiellement nécrotique, d'origine synoviale." Dans le cas de Madame C., "le prélèvement est entièrement constitué par un sarcome très polymorphe et partiellement nécrotique, d'origine très probablement synoviale." Subséquemment, la jambe fut amputée et le 12 septembre, le professeur Louis Berger faisait un nouveau rapport: "Il s'agit d'un sarcome polymorphe parsemé de foyers nécrotiques et purulents, dont l'aspect partiellement histiocytaire et muco de est en faveur d'une origine synoviale (bursique)."

GOITRE ET TROUBLES CARDIAQUES.—J. B. Jobin, Richard Lessard et R. Caouette.

1,300 cas de goîtres observés en 10 ans (1934-43), à l'Hôtel-Dieu de Québec. Nous trouvons 7 femmes pour 1 homme. Les goîtres simples représentent près de la moitié du nombre total. Nous remarquons que le nombre des maladies de Basedow est à peu près égal à celui des adénomes toxiques. La pression artérielle est augmentée dans 77 cas sur 100 de nos goîtres toxiques. Le pouls est accéléré chez 88% des sujets porteurs de goîtres avec hyperthyroïdie. Nous avons observé 16 cas d'insuffisance cardiaque associée ou non à de la fibrillation auriculaire; ces cas s'observaient surtout chez des femmes porteuses d'un adénome toxique. L'association goître, insuffisance cardiaque ne constitue pas une contre-indication à la thyroïdectomie même s'il existe en plus de l'arythmie complète.

213 malades ont eu un électro-cardiogramme. 46 fois le tracé électrique était normal, alors que 167 fois nous avons observé soit un trouble du rythme, ou une altération des complexes, ou tout simplement une prépondérance ventriculaire quelconque. Il n'existe pas de profil électro-cardiographique caractéristique dans les altérations thyroïdiennes.

Séance à la clinique Roy-Rousseau. Vendredi, le 20 octobre, à 8.30 heures du soir.

L'INSUFFISANCE THYROÏDIENNE EN PSYCHIATRIE.—Jean Chs Miller.

Après avoir rappelé l'importance des fonctions neuro-glandulaires sur la vie végétative, affextive et le comportement général de l'être humain, l'auteur démontre l'influence prépondérante du corps thyroïde, par suite de sa riche innervation amphotone, son action métabolique et ses liaisons synergiques nombreuses. Et c'est ainsi que cette glande contribue largement aux échanges nutritifs et à la vie végétative en général, en même temps qu'au tonus musculaire, à la tonalité affective, et à l'activité mentale.

Les dysthyroïdies se retrouvent très souvent à la base même de troubles mentaux (crétinisme, myxœdeme ou Basedowisme), ou encore apparaissent au cours d'évolutions psychiatriques déjà déclanchées: (démence précoce, colie puerpérale, dépression mélancolique, involution sénile, etc.). Suivent de nombreuses observations de malades dont l'âge varie de 14 mois à 63 ans. Dans ces cas la médication thyroïdienne a élevé le métabolisme et la tension artérielle, acceléré le rythme végétatif et psychomoteur, en même temps qu'elle profitait à l'état général physique et mental, à la pousse des cheveux, etc.

Cette expérience thérapeutique fut rendue possible par la maison DesBergers-Bismol qui a gracieusement fourni son "Thyronol" en tablettes d'un grain et d'un quart de grain, présentations fort commodes. L'expérience a permis de constater l'efficacité de ce produit, en même temps que sa toxicité réduite.

CONSIDÉRATIONS SUR LA PROBLÈME DES BRUCELLOSES À L'HÔPITAL ST-MICHEL ARCHANGE.—C. A. Painchaud.

Dans la première partie de son travail l'auteur montre l'existence a l'état endémique de la brucellose bovine (avertement contagieux—maladie de Bang) dans l'exploitation de bovins de l'Hôpital St-Michel Archange. Un fort pourcentage des animaux sont atteints de cette infection vérifiée dans le troupeau par l'épreuve de la séro-agglutination de Wright.

Dans le but de se rendre compte de la répercussion sanitaire au point de vue brucellose chez les consommateurs de lait cru provenant de cette source infectée, l'auteur a pratiqué chex plus de 200 patients l'épreuve du séro-diagnostic. De ce nombre il en choisit 1,620 qui représentent ceux qui ont consommé ce lait depuis au moins une année. L'épreuve lui a révélé l'existence d'un certain nombre de formes latentes, inapparentes de brucellose humaine. Il consigne l'importance de cette notion des formes inapparentes révélées uniquement par le laboratoire.

Il constate de plus par cette épreuve, que, malgré l'existence de nombreux cas de brucellose animale, la brucellose humaine n'avait eu jusqu'à date aucun caractère de gravité, fait sans doute attribuable au faible pouvoir pathogène de brucella abortus pour l'homme.

Cependant le problème du point de vue brucellose animale lui était apparu beaucoup plus sérieux. Devant l'échec ou les progrès trop lents des mesures jusque là préconisées pour combattre cette infection chez l'animal, il suggère l'emploi des sulfamidés, administrés selon un mode qu'il décrit. Avec cette chimiothérapie, depuis près de quatre années, on a revu aucun nouveau cas d'avortement chez les bovinés. Les animaux sont-ils guéris de leur infection? Pour s'en rendre compte il pratique la séro-diagnostic dans le sang et le lait des animaux infectés et traités par les sulfamidés. Dans une deuxième expérience il pratique l'inoculation au cobaye de tous les laits d'animaux présentant une réaction positive dans le sang, que la réaction soit positive ou négative dans le lait. Avec 14 inoculations, il obtient trois résultats positifs: les animaux présentent des lésions de brucellose et leur sang contient des agglutinations spécifiques. L'auteur croit que malgré la persistance de l'infection, la chimiothérapie devrait être poursuivie sur une plus grande échelle, à cause de son action anti-abortive; parce que en supprimant les avortements on supprime la grande cause de pertes matérielles, les dangers de dissémination de l'infection, et par tant aussi les dangers de contagion pour l'homme.

En terminant l'auteur insiste sur la valeur du séro-diagnostic, et tout particulièrement du procédé rapide décrit par Huddleson, dans le diagnostic de l'infection brucellique, bovine et humaine, quelle que soit la forme de cette dernière, aiguë ou chronique, apparente ou non cliniquement.

Il souligne de plus l'utilité de la brucellose expérimentale qui du point de vue pratique pourrait rendre service au cours d'enquêtes épidémiologiques.

Enfin, il croit que la brucellose animale devrait être mieux connue des médecins parce qu'elle est à l'origine de la brucellose humaine.

ELECTROCHOC ET CRÂNIOPATHIES.—C. A. Martin.

On présente les observations de quatre malades porteurs de lésions crâniennes qui ont été traités par l'électrochoc pour en déduire les conclusions suivantes:—

1°. Les lésions crâniennes qui ne sont pas en rapport direct avec les troubles mentaux nomme dans un cas de facture du crâne et d'une maladie de Paget localisée au crâne seulement ne sont pas des contre-indications à l'électrochoc.

2°. Dans les cas où les troubles mentaux sont une conséquence directe des lésions crâniennes, comme dans deux cas d'hyperostose frontale interne, l'électrochoc n'est pas indiqué.

3°. Les lésions crâniennes de nature pagetique semblent abaisser considérablement le seuil d'excitation électrique, tandis que les fracteurs et l'hyperostose crânienne ne l'influencent pas.

CONSIDÉRATIONS CLINIQUES D'UN CAS DE TUMEUR CÉRÉBRALE.—S. Caron.

Le docteur Sylvio Caron a fait plusieurs fois l'observation qu'au cours de la dégénérescence d'un gliome cérébral les patients présentaient des ptoses de somnolence et d'inconscience accompagnées d'une aggravation des symptômes paralytiques suivies de phases de lucidité correspondant avec une amélioration notable de la paralysie. Ce signe a pour lui une importance capitale.

Vancouver Medical Association

The first sessional meeting of the Vancouver Medical Association was held on October 3. We were fortunate to have as our guest Dr. Norman MacKenzie, President of the University of British Columbia, who spoke briefly.

Winnipeg Medical Society

The opening meeting of the 1944-45 season of the Winnipeg Medical Society was held in the Medical College on October 20 with Dr. P. H. McNulty in the chair. Dr. C. M. Strong presented Dr. F. D. McKenty who was made a Life Member. Dr. F. G. Allison read a paper on Coronary Diseases; Colonel Hurst Brown, R.C.A.M.C., head of the Medical Research Department of Canadian armed forces told of the research problems being tackled and solved in his department; Lt.-Col. Donald McEachren discussed Epilepsy. Dr. J. P. George reported a case of Ectopia Cordis with survival for forty hours after birth. This was illustrated by unusually clear moving pictures in colour of the infant taken by Mr. William Doern, senior x-ray technician, Winnipeg General Hospital.

Special Correspondence

The London Letter

(From our own correspondent)

Social Insurance

The Beveridge Plan has now been translated into two White Papers and the medical aspects of the sweeping changes proposed are of great interest.

Taking the second White Paper first, which deals with workmen's compensation, the whole basis of this is changed to make it in effect an industrial injury insurance scheme. In other words, in future the question of compensation will be made a social service and not a matter for prolonged legal disputes. The compensation to be given will be based upon the degree of disablement, and the casualties of industry will be put upon the same footing as the casualties of war, using in fact, the same medical boards of the Ministry of Pensions.

With regard to the first White Paper, there is now to be one single weekly contribution for all benefits, which range from maternity benefit and children's allowances to a grant for funeral expenses. Doctors, for the first time, will be paying contributions and it does look as if a comprehensive medical service must come for 100% of the population if the Social Insurance proposals go through.

B.M.A. Meeting

In other words, the forthcoming discussions at the annual representative meeting of the British Medical Association must take place in the light of Social Insurance proposals. Some of the resolutions proposed by the different divisions can scarcely be said to appreciate the reality of the situation, for it is clear that to assert that the Government has no mandate to proceed with its plans for a comprehensive health service, has little likelihood of success if the delegates are prepared to face things as they are.

Nevertheless, the British Medical Association meeting has got much to do and it says something for the high ideals of the profession that there is more desire to discuss the general administrative proposals than to wrangle about such subjects as remuneration, compensation and pensions. It is hoped that negotiations with the Government will start in January and that the B.M.A. representatives will be briefed by satisfactory decisions conceived with the nation's good as the main consideration.

Harvey Celebrations

For the first time in its history, the Royal College of Physicians left London for its annual St. Luke's Day celebrations, and this year's Harveian oration was delivered in Manchester by Sir Edmund Spriggs, with a small festival dinner taking the place of the customary banquet. The subject chosen by the orator was the application of Harvey's method to literature, and he showed how the experimental method which has meant so much to science, also meant much to the writers after Harvey's time. The number of doctors who had become famous in the literary world and the number of writers who had been influenced by doctors or scientists, were surprisingly high and included such names as Smollett, Keats, Schiller, Flaubert, and in modern times, Somerset Maugham.

The Royal Society of Medicine

Steps are now being taken to secure important developments at the headquarters of this important organization. An appeal for fifty thousand pounds has been launched to put a new top floor on the building, principally to add an additional library, a third meeting room, and a special room for clinical demonstrations. The number of Fellows is three times what it was when the present premises were built, and moreover, a library is now available for anyone who needs its help. The modern developments of photostat and film versions of books and papers, add to the Society's activities. The war-time facilities for medical men in the allied Forces have been greatly appreciated by all concerned so that in its new developments the Society can rightly have some call upon international help.

ALAN MONCRIEFF.

London, November, 1944.

Those who have read of everything are thought to understand everything, too; but it is not always so. Reading furnishes the mind only with materials of knowledge; it is thinking makes what we read ours.—John Locke.

Canadian Medical War Services

MEDICAL OFFICERS APPOINTED TO THE R.C.A.M.C. — ACTIVE FORCE

AUGUST and SEPTEMBER, 1944

(Previous sections appeared in the issues of February, March, May, July, September, November and December 1943, and in each issue for 1944 except April and September.)

SECTION XXIX

Name	Address	Date of Appointment
Adams, S. T.,	Westmount, Que.	16-8-44
Allen, M.,	Three Rivers, Que.	22-8-44
Beaulieu, J. P. E.,	Montreal	1-8-44
Berman, J. A.,	Montreal	16-8-44
Bernier, J.,	Montreal	1-8-44
Black, H. H. deB.,	Montreal	16-8-44
Boucher, J. H. R.,	Montreal	1-8-44
Boudrias, J. J.,	Sherbrooke, Que.	1-8-44
Brunet, J. L.,	Montreal	1-8-44
Chabot, C.,	Ste. Claire, Que.	6-7-44
Cooper, S. R.,	Montreal	16-8-44
Crux, N. W. G.,	Edmonton	1-7-44
Dargis, J.,	Three Rivers, Que.	6-7-44
Finley, J. A.,	Saint John, N.B.	21-8-44
Fitzgerald, M. F.,	Sydney, N.S.	15-6-44
Foucault, W.,	New York City	6-7-44
Gagnon, L. P.,	Matane, Que.	1-8-44
Gervais, R.,	St. Paul, Que.	6-7-44
Gibbons, R. J.,	Ottawa	21-6-44
Goodman, W. E.,	Outremont, Que.	16-8-44
Grise, E. A.,	Bradford, Ont.	7-8-44
Gourdeau, R.,	Levis, Que.	6-7-44
Guay, J.,	Montreal	1-8-44
Hamel, P. E.,	Magog East, Que.	1-8-44
Harris, M. E.,	Montreal	9-5-44
Howatt, F. F.,	Charlottetown, P.E.I.	29-4-44
Hubert, R.-P.,	Quebec	6-7-44
Kirkpatrick, T. C.,	New Hamburg, Ont.	11-9-44
Kurtze, W. L.,	Regina, Sask.	14-8-44
Labrecque, E.,	Quebec	6-7-44
Lachance, J.-W.,	Orleans Island, Que.	6-7-44
Lamquin, R. J.,	Montreal	1-8-44
Laplante, M. A.,	Montreal	1-8-44
Laramee, J. A., F.,	Outremont, Que.	1-8-44
Larouche, G.,	Cacouna, Que.	6-7-44
Lavergne, P. H.,	Montreal	18-7-44
Leclerc, L. R.,	Granby, Que.	1-8-44
Leduc, L. J.,	Montreal	1-8-44
Lemieux, R. R.,	Noranda, Que.	1-8-44
Levesque, J.-M.,	St. Jerome, Que.	6-7-44
Lloyd-Smith, W. C.,	Montreal	16-8-44
Longmore, A. J.,	Toronto	23-8-44
Longtin, J.,	Ste. Philippe de Laprairie, Que.	1-8-44
Marcoux, J. R.,	St. Cuthbert, Que.	1-8-44
Marinker, S.,	Estevan, Sask.	1-8-44
Marksfield, W. C.,	Lachine, Que.	16-8-44
Maunsell, D. B.,	Cardinal, Ont.	29-4-44
Maxfield, F. B.,	Foam Lake, Sask.	15-7-44
Michaud, J. T.,	Kamouraska, Que.	6-7-44
Murray, G. M.,	Sydney, N.S.	11-5-44
McCallum, J. L.,	Avoca, Que.	16-8-44
Natsuk, A. W.,	Winnipeg	3-8-44
Niloff, P.,	Sherbrooke, Que.	16-8-44
Ormrod, J. K. T.,	Three Rivers, Que.	16-8-44
Ouimet, J. G. R.,	Montreal	1-8-44
Parker, G. M.,	Toronto	31-5-44
Patrick, J. W.,	Montreal	16-8-44
Pedvis, S.,	Quebec	16-8-44
Pilon, L. J.,	Montreal	1-8-44
Piuze, Y. E.,	Westmount, Que.	1-8-44
Powles, W. E.,	Montreal	16-8-44
Racine, J. A. R.,	L'Abord a Plouffe, Que.	1-8-44
Ridge, J. M.,	Winnipeg	22-6-44
Rochon, G. A.,	Farnham, Que.	1-8-44
Romeyn, J. A.,	Edmonton	15-7-44
Saulnier, G.,	Chicoutimi, Que.	6-7-44
Senecal, J. N. P.,	Montreal	16-8-44
Shapiro, B. J.,	Outremont, Que.	16-8-44
Thomas, C. M.,	Rivers, Man.	1-8-44
Thomas, G. W.,	Montreal	16-8-44
Tremblay, A.,	Bagotville, Que.	6-7-44
Tremblay, B. M.,	Lachute Mills, Que.	1-8-44
Tremblay, J. J.,	Valleyfield, Que.	1-8-44
Varverikos, E.,	Montreal	6-7-44
Verville, H. W.,	Sioux Lookout, Ont.	26-5-44
Visser, A. H.,	Montreal	16-8-44
Wiener, F.,	Outremont, Que.	16-8-44

MEDICAL OFFICERS STRUCK OFF STRENGTH OF THE R.C.A.M.C.—ACTIVE FORCE

AUGUST and SEPTEMBER, 1944

Name	Address	Date struck off strength
Adams, H. R.,	Long Branch, Ont.	2-9-44
Beaubien, F.,	Bergerville, Que.	17-6-44
Belanger, P. B.,	Ottawa	18-8-44
Brownlee, T. I.,	Russell, Man.	16-9-44
Derbyshire, W. J. B.,	Fort Erie, Ont.	29-8-44
Epp, H. W.,	Ottawa	1-9-44
Feick, T. B.,	New Hamburg, Ont.	21-8-44
Fish, F. H.,	Calgary, Alta.	7-9-44
Gorman, M. E.,	Lindsay, Ont.	1-9-44
Hagerman, A. R.,	Toronto	1-9-44
Hamilton, K. A.,	Edmonton	15-9-44
Hammond, A. S.,	Fort Erie, Ont.	6-7-44
Geissinger, M. E.,	Edmonton	30-7-44
Kennedy, A. E.,	Winnipeg	16-7-44
Malouf, G. M.,	Morristown, N.Y.	23-6-44
McCullough, J. A. L.,	Toronto	13-7-44
MacIsaac, W.,	Glace Bay, N.S.	14-8-44
McNichol, H. L.,	Flin-Flon, Man.	19-9-44
Pollack, J. O.,	Forest Hill Village, Ont.	25-7-44
Ross, A. G.,	Elk Point, Alta.	11-8-44
Schnittman, M.,	Toronto	29-8-44
Scott, D. E.,	Wiarton, Ont.	1-9-44
Shipley, M.,	Invermay, Sask.	13-9-44
Steer, J. C. D.,	Toronto	4-8-44
Walton, C. H. A.,	Winnipeg	7-9-44

MEDICAL OFFICERS APPOINTED TO THE R.C.A.M.C.—ACTIVE FORCE

OCTOBER, 1944

SECTION XXX

Name	Address	Date of Appointment
Attendu, C. A.,	Ville St. Pierre, Que.	1-10-44
Belanger, J. C.,	Montreal	19-9-44
Brault, J. J. P.,	Valleyfield, Que.	6-9-44
Brockington, C. W. M.,	Ottawa	18-9-44
Carignan, A.,	Victoriaville, Que.	22-8-44
Cawthorpe, H. A.,	Montreal	18-9-44
Cockfield, R. L.,	Brechin, Ont.	25-9-44
Cowley, F. C.,	Ottawa	18-9-44
Crofton, D. L. F.,	Victoria, B.C.	8-9-44
Damphousse, A.,	St. Paulin, Que.	22-8-44
Dupuis, P.,	Ste. Anne de la Pocatière, Que.	22-8-44
Fillmore, E. E.,	Advocate Harbour, N.S.	18-9-44
Gilbert, C. A.,	Quebec	22-8-44
Gosselin, F. A.,	Levis, Que.	22-8-44
Groleau, Y.,	St. Zacharie, Que.	22-8-44
Hardman, J. G.,	Revelstoke, B.C.	8-9-44
Heller, B. P.,	Outremont, Que.	6-10-44
Hicks, A. R.,	Cumberland, B.C.	14-9-44
Holden, C. P.,	Fredericton, N.B.	18-9-44
Howie, V. S.,	Montreal	1-9-44
Irwin, G. E.,	Temiscamingue, Que.	6-7-44
Jewell, J. B.,	Montreal	18-9-44
Johnston, E. B.,	Newburg, N.B.	18-9-44
Karn, G. M.,	Montreal	30-8-44
Knox, A. W.,	Kelowna, B.C.	8-9-44
Kobernick, D. R.,	Outremont, Que.	21-9-44
Kulscar, D.,	Montreal	19-9-44
Lang, A. C.,	Vancouver	8-9-44
Lavallee, L.,	Quebec	22-8-44
Leblanc, J.,	Champlain, Que.	22-8-44
Likely, J. C.,	Montreal W., Que.	18-9-44
Mahon, J. D.,	Taber, Alta.	18-9-44
Morton, A. C.,	Carleton Place, Ont.	18-9-44
McCrea, J. C.,	Moncton, N.B.	18-9-44
MacGuire, H. C.,	Montgomery, Alabama, U.S.A.	18-9-44
MacPherson, R. H.,	Moncton, N.B.	18-9-44
Newman, W. G.,	Winnipeg	1-9-44
Parlee, H. B. G.,	Saint John, N.B.	18-9-44
Parsons, R. M.,	Ochre Pet Cove, Nfld.	18-9-44
Redmond, L.,	Montreal	16-8-44
Rose, T. F.,	Montreal	18-9-44
Schapira, M.,	Borden, P.E.I.	5-9-44
Simard, F.-X.,	St. Joseph d'Alma, Que.	22-8-44
Swanson, A. L.,	Vancouver	5-9-44
Wilson, W. W.,	McNamee, N.B.	18-9-44

MEDICAL OFFICERS STRUCK OFF STRENGTH OF THE R.C.A.M.C.—ACTIVE FORCE

OCTOBER, 1944

Name	Address	Date struck off strength
Astrof, S.,	Westmount, Que.	13-9-44
Brayley, L. G.,	Port Credit, Ont.	16-9-44
Byers, J. N. C.,	Rimbey, Alta.	4-10-44
Edis, J. F.,	Toronto	16-9-44
Elvin, N. L.,	Winnipeg	20-9-44
Fish, F. H.,	Calgary	7-9-44
Hames, C. F. W.,	Regina, Sask.	13-9-44
Jepson, G. L.,	London, Ont.	17-10-44
Kirouac, C. A.,	Quebec	21-9-44
Kobrinsky, S.,	Mazenod, Sask.	20-9-44
Meakins, J. C.,	Montreal	21-9-44
Mulligan, C. V.,	Toronto	20-9-44
McManus, J. P.,	Garden Island, Ont.	9-10-44
MacPhee, J. A.,	Summerside, P.E.I.	29-9-44
Reid, J. A.,	Calgary	10-10-44
Sommerville, A. N.,	Winnipeg	14-10-44
Sutherland, J. W.,	Amherst, N.S.	23-8-44
Tennant, P.S.,	Kamloops, B.C.	18-10-44
Thompson, F. G.,	London, Ont.	2-10-44
Tremblay, A.		26-9-44
Trudelle, J. B.,	Regina, Sask.	9-10-44
Wells, T. J.,	Beebe, Que.	29-9-44

Miscellany

BETTER CARE NEEDED FOR PATIENTS IN MENTAL HOSPITALS

An Address (in part)

By Samuel W. Hamilton, M.D.*

Why are we in such position that we have to keep insisting in order to assure our patients not only the best known treatment, but even decent, kindly care? When standards have once been set, why cannot we expect that local authorities will live up to them? Why cannot we take something for granted—that the first part of our job has been done after thirty-odd years—and put all our energies and our resources, all too meager as they are, into other important, yes, urgent problems of mental hygiene?

General hospitals do not function perfectly and the American College of Surgeons and the American Medical Association can tell tales of evils that come back, after they once seemed to be corrected. We hold great respect for the tuberculosis sanitaria, but things do not always go right in the tuberculosis field and now that the Federal government is making some grants, I learn of places where standards already set are not rightly adhered to. Sometimes one thinks that our problem of assuring kindly care will never be fully solved, for unkindness is fundamental in human nature and must always be watched for and combated where persons of contrary temperament (as are many of the mentally ill) must be taken care of by other human beings, subject to prejudice, faulty rearing, lack of understanding, and emotional outbursts.

*Mental Health Adviser, Division of Mental Hygiene, U.S. Public Health Service.

GOOD PHYSICIAN COMES FIRST

The activities of a good mental hospital are many and varied. At the top let us put the dealings of the individual physician with his patients. This is psychotherapy. Obviously the physician needs to understand his patients very well and to bring to bear on each whatever type of management and interview is likely to be most helpful. The work of the nurse is extremely important. She should be—or should become—a true psychiatric nurse, able to understand the significance of what patients do and say, able to undermine their faith that bizarre conduct will bring rewards, and able to direct her patients into better channels. This too is psychotherapy. I would draw no sharp line between nurse and attendant. One perhaps expects less of ordinary attendants than of ordinary nurses but either group, unless trained and guided in some way, may fall short of a grade of accomplishment that is perfectly easy to attain when the hospital is definitely organized and administered to that end. There are several important adjunct therapies such as occupation therapy and bibliotherapy (treatment with literature); physiotherapy, of which an important branch is hydrotherapy; and physical training, which is indeed very important; and even music therapy. The management of questions of feeding is somewhat complicated, calls for high intelligence and is notoriously mismanaged in this country.

The patient is followed to his home by the hospital social service. Most of our best hospitals conduct some sort of out-patient work in connection with departments of health, general hospitals, social agencies, parents' courts and other bodies.

MORE NURSES NEEDED

The first opportunity that I emphasize is to assure the patients of your State that those who take care of them will be persons of reasonable intelligence, of devotion to their duty and of as much training as can usefully be provided. The number of mental patients increases steadily and will continue to increase, no doubt, so long as the expectancy of human life in this country increases, for where the number of old folks is greater, the number of mentally ill old folks is still greater yet. We should seek to assure our hospitals of a material number of psychiatrically experienced nurses. It would be wonderful if we could have one such nurse to 25 patients. We can do a very good job with one to 50, and if you give us one to 75 we will get along; but, of course, you do not give us even that ratio. There ought to be enough attendants in addition to the nurses so that the total ratio will be about one to 5.6 or 5.7. We need a salary schedule that will enable us to get persons of good background and the right temperament. We then need a program of training.

The second opportunity is to make sure that the best treatment is administered. Here we get into the field of medical qualifications. I do not propose that any Society for Mental Hygiene should attempt to prescribe the details of treatment for the patients in its hospitals, but it should be in a position to demand that the right kind of physicians in adequate numbers constitute the staff of every mental hospital. Salaries have a good deal to do with this. A State that thinks so little of its physicians that it does not give them an opportunity to live comfortably has no right to expect that it will get the services of very able men for any length of time. Able men will come and go. Less able ones may stay. Of course terms of appointment and security of tenure enter into this, and those States in which a physician can expect to lose his job the next time the Governor changes, are not the States that can expect the best medical service.

MENTAL HYGIENE CENTRE

Another opportunity is to make the mental hospital a centre of all mental hygiene work. The State hospital should be a place where we could expect any type of activity for mental health to have consideration, sound advice, and probably at least some initial assistance. The first implication is that there will be out-patient work carried on by some members of the staff of the hospital. Generally a public mental hospital that has no out-patient work is not doing the best in-patient work either. If information is sought by local groups, somebody at the State hospital ought to be able to give it.

The public mental hospital should be a great teaching post. Young physicians come to the hospital to learn the principles of psychiatric examination, diagnosis and treatment; older physicians, when the community is properly organized, come to it from time to time to be given clinical demonstrations and to hear communications on important questions of treatment. Special therapists of several sorts may be given a valuable part of their training in a mental hospital. Schools of occupation therapy usually place some or all their pupils in selected State hospitals for a period of field work; and in a few places, students of physical therapy have a similar experience. There should be more and better training for male nurses when the war is over.

Mental hospitals have a tremendous opportunity for usefulness in the community through active participation in the life of former patients. The hospital should develop suitable out-patient posts, giving the physician opportunity to go to them at stated intervals and see such former patients as need his help. Inevitably from such a start additional out-patient work develops.

We must think of our institutions for defectives and epileptics as not only schools but also

hospitals. Their educational function is highly important, but both types of institution house many patients who need much more than schooling, many indeed who require a great deal of fundamental medical care as well as psychiatry.

A Window on Scottish Slums

For many years to come stories of the wartime evacuation from Glasgow and Edinburgh and their outflow north and south will be told in the burghs, villages, and glens of Scotland. The authentic story of the woman quartered in a cottage on a Highland estate: "Ma weans were told they were to sleep in the King's bedroom. This'll no' do." The children who, after a good dinner, were confronted with a plain tea with warm scones: "We're no' takin' that. You're paid by Government. We're for ham and eggs." And as a sidelight on the habits of some, the mother's remark: "Johnnie, don't use the lady's carpet, use the surround." The publication early in 1943 of *Our Towns: A Close-up* administered a wholesome shock to the social conscience of England, and now a group of Scottish women—the editorial committee of the Scottish Women's Group of Public Welfare—have done the same for their own country.[1] They tell the story of the 180,000 children and their mothers who have been packed away in 500 trains from Scottish towns to rural places during the war. For the most part it is a melancholy tale. Complaint is made that many of the mothers had not the most elementary knowledge of plain and simple feeding. But the bitterest complaint concerned the uncleanliness of the children. In one village which received its entire contingent from a slum school 50% were said to have dirty heads, 30% impetigo, and 20% to be incontinent in their habits. Drastic action was taken in this case by officials and housewives, with a resulting fall of four feet in the local reservoir and a dearth of disinfectants at the chemist's shop. As for enuresis, it is impossible to estimate in what proportion of cases this was temporary and brought on by excitement or nervousness and perhaps by the coldness of country houses, but many of the children seemed never to have been trained to make use of toilet conveniences. On the other hand, the strangeness and loneliness of the new environment to people who have been living 188 to the acre has to be remembered. Many of them had been transported from Glasgow slums to Highland shooting lodges, and the loneliness was too much for them. In one mansion several families were allotted a room each, but in the morning all the twenty-five women and children were found huddled in two rooms and they left within ten days. Amid so much filth and fecklessness two very human touches stand out—the unity of the family and the fear of an institution. No Government circular was ever more tightly grappled to the breast than the official promise not to break up the family. They must literally touch one another at night. A bus laden with weary mothers and children drew up at the entrance to a huge square mansion where the eager kind hostess awaited her guests with every comfort. "No' me! No' me! I'm no' gaun into an institution!" they cried, and wild horses would not have dragged them up the steps. However social reconstruction is to come about, it is evident that the integrity of the family is a factor to be placed in the forefront.—*Brit. M. J.*, Oct. 7, 1944, p. 476.

1. *Our Scottish Towns: Evacuation and the Social Future.* Edinburgh: W. Hodge and Co., Ltd. (1s 6d.)

Northern Philosophy

Behold the magic of the woods,
A power that moves midst solitudes,
The light the leaves breathe from the sun.
When nature's alchemy is done.
Tall pine with birch and maple grow
Ridge upon ridge, dark spruce below.
And this same power in plot and field
Makes golden crops to labour yield;
And forms beyond all ken or notion
In the vast rolling fields of ocean.

In city streets life is expended,
Depleted, wearied, almost ended.
Brick walls and pavements do not give
One jot of power by which men live.
Man, motor like takes in, expends
His energy, to varied ends.
Food he breaks down and then remakes
To his own flesh; the light he takes
And lo! a wondrous change is wrought,—
'Tis warmth and energy and thought.

But man's a spirit; he must need
Have other foods on which to feed
His soul. In woods I always feel,
When from drab city streets I steal
To mountain forests, northern skies,
Where silence like a bright spell lies,
A calm, a building up of spirit.
I feel akin, or very near it,
To some strong everlasting force
By Nature stored with God its source.

J. E. GIMBY, M.D.

Of itself the mere act of selecting and practising in a special branch of medicine has never indicated special ability. Many specialists, like most human beings, are of ordinary attainments in a scientific and technical sense. Many men of equal ability, perhaps even greater, remain in the ranks of the general practitioners.—*A National Health Service*, Douglas Robb.

Abstracts from Current Literature

Medicine

Part-time Protective Environment and Working Parole as an Adjuvant in the Treatment of Alcoholism. Thimann, J.: *New Eng. J. Med.*, 1944, **231**: 9.

Alcoholism is difficult to treat and its treatment constitutes a serious economic problem for the tax payer. A plan has been worked out at the Washington Hospital, Boston, which the author considers of great value in bringing about physical, emotional and economic rehabilitation of the alcoholic patient. Conditioned-reflex therapy is employed and, when able, the patient secures employment but continues to live at the hospital, where he spends all his time apart from working hours. Not only does this provide a protected environment but it also allows prolonged psychotherapy. The patient becomes self-supporting and self-reliant and able to adjust to the difficulties of life. Such a program should be continued for about a year and has been very successful.

NORMAN S. SKINNER

Observations of Atypical Pneumonias of the Influenzal Virus Type. Brethauer, E. A. and Thompson, R. T.: *Ann. Int. Med.*, 1944, **20**: 884.

A series of 19 cases of influenzal pneumonia was studied, in which there was a fatality of 31%. The high fatality rate is accounted for by toxicity of the infection and mechanical and physiological disturbances of circulation as a result of partial occlusion of the pulmonary vascular bed, dilatation of the right heart, and a decrease of left ventricular output. Repeated clinical observations of heart sounds, pulse rate and blood pressure in the presence of an influenzal pneumonia are stressed because they aid in the anticipation of development of pulmonary œdema and indicate the necessity for certain therapeutic precautions.

Early confinement to bed, the early administration of oxygen, and the contraindications to fluids administered intravenously in cases of influenzal pneumonia are stressed.

S. R. TOWNSEND

Glycosuria in Meningitis. Ferguson, F. and Barr, D.: *Ann. Int. Med.*, 1944, **21**: 173.

Spontaneous glycosuria occurs frequently at the onset of meningitis. It appeared in 16 of 72 consecutive cases of meningitis and in over one-third of 26 cases of meningococcic meningitis. It was encountered in meningitis caused by the meningococcus, the pneumococcus, the staphylococcus, the tubercle bacillus and in one case in which the causative organism was not isolated. Glycosuria was accompanied in many instances by ketosis, hyperglycæmia, and diminished tolerance to sugar. Glycosuria was transient, disappeared in all cases, and persisted beyond the third day in only 3 of 16 cases.

Coma with glycosuria and ketosis at the onset of meningitis may mask the signs of meningeal involvement, lead to a diagnosis of diabetic acidosis, and cause serious or fatal delay in instituting appropriate treatment for the meningitis.

S. R. TOWNSEND

Adenocarcinoma of Small Intestine in Father and Daughter. Foster, D. B. E.: *Brit. M. J.*, 1944, **2**: 78.

Adenocarcinoma of the small intestine is relatively rare as compared with the same condition in the large intestine, therefore its occurrence in two related persons is of correspondingly greater significance than adenocarcinoma of the large intestine in related persons. A man of 43, who had suffered from abdominal pain and attacks of passing mucus and blood by rectum for twelve years, suffered from an intussusception of the small intestine caused by an adenocarcinoma. His brother also had a history of abdominal pain and blood and mucus in the stools. His daughter of 16 had an intussusception induced by adenocarcinoma of the small gut. The cases of the father and daughter were proved at operation for the relief of the obstruction.

MADGE THURLOW MACKLIN

Cerebral Glioma in Siblings. Riese, W., Meredith, J. M. and Zfass, I. S.: *South M. J.*, 1944, **37**: 424.

A man of 51 suffered from symptoms which were dependent upon the presence of a cerebral glioma as determined at operation. His sister had died at 39, with brain tumour shown to be cerebral glioma. No mention was made of other brothers and sisters. The father of these two was murdered at the age of 30, the mother died at the age of 59 of asthma. Again the relative rarity of this type of tumour occurring in two members of a family is strongly suggestive of an hereditary basis for the tumour.

MADGE THURLOW MACKLIN

Surgery

Plasma Cell Mastitis. Parsons, W. H. *et al.*: *Arch. Surg.*, 1944, **49**: 86.

This clinical entity was first described by Adair in 1933, under the name plasma cell mastitis. This is a relatively uncommon disease, but it is important on account of its clinical resemblance to carcinoma of the breast. So much so that in at least one-half of the recorded cases, primary radical mastectomy was performed, on the assumption that the inflammatory swelling was malignant.

The chief objective signs of this lesion are (1) a unilateral painless breast tumour which occurs in parous women; (2) mild and evanescent signs of inflammation; (3) a watery or a creamy discharge from the nipple; (4) frequent adherence to the skin so as to produce orange peel dimpling; (5) frequent retraction of the nipple; (6) axillary lymph nodes likely to be enlarged; (7) brown discoloration of the mammary tissue often associated with the formation of an abscess. Histologically there are (1) ulceration of the normal epithelium of the ducts which is replaced by granulation tissue; (2) formation of foreign body giant cells and periductal collections of plasma cells and other leucocytes, whence the term plasma cell mastitis. The authors report 5 instances of this lesion which they conclude is a periductal inflammatory reaction caused by the extravasation of material from the ducts into the periductal fibrous tissue. It is a true clinical entity.

G. E. LEARMONTH

Roentgen Features of Chronic Tuberculous Peritonitis. McCort, J. J.: *Arch. Surg.*, 1944, **49**: 91.

It is generally agreed that the clinical diagnosis of tuberculous peritonitis is difficult. Particular attention has been paid at the Massachusetts General Hospital to the possibility of establishing by roentgen examination a preoperative diagnosis; the condition of 3 patients who were admitted to the hospital subsequently was correctly diagnosed by the examining radiologist. The present paper presents these 3 cases and 3 additional proved cases of tuberculous peritonitis in which complete roentgenological study of the large and the small bowel revealed certain characteristics. Tuberculous peritonitis results in a diffusive adhesive process involving the peritoneal surfaces. This gives rise to certain distinctive features which may be seen on the plain roentgenogram and on roentgenograms of the large and small intestines taken after barium sulphate enemas. (1) A low grade ileus with a varying amount of intra-abdominal fluid will be seen on the plain roentgenogram. (2) The barium sulphate enema will show the large bowel to be in a fixed position. Occasionally adhesions can be demonstrated. (3) The enema of the small intestine will disclose rapid passage of the barium sulphate as a rule. The loops of the intestine are bound together and the bowel is shorter than normal. Abnormal segmentation may be seen.

G. E. LEARMONTH

Obstetrics and Gynæcology

A Human Ovum Nine to Ten Days Old. Davies, F. and Harding, H. E.: *J. Obst. & Gyn. Brit. Emp.*, 1944, **51**: 225.

The structure of a previllous human ovum estimated to be 9 to 10 days is described. With the 9.5 day Rock-Hertig ovum, it constitutes the earliest stage of the fully implanted human ovum so far discovered. The specimen indicates that primitive mesoblast formation is even more precocious in its development in the human than in other primates and that, in contrast to the claim of Streeter, differences are found in the structural details of early human and macaque ova of corresponding ages. The findings favour the view that whereas the ectodermal and endodermal layers of the germ disc are derived from the formative cell mass, the amnion and exocœlomic membrane are mesoblastic in origin. Comparison with other ova suggests that the yolk sac develops rapidly round about the 12th and 13th day in the human. Reference is made to early pathological changes in both embryonic and endometrial elements which may lead to abortion. Ovulation is deduced to have occurred about the 9th day of the cycle; the endometrium is as far advanced in the secretory phase on the 20th day in the present case as on the 24th or 25th day in a number of specimens in which ovulation probably occurred about the 14th day. P. J. KEARNS

Oxytocic Drugs and Their Use. Moir, C.: *J. Obst. & Gyn. Brit. Emp.*, 1944, **51**: 247.

A careful review of the oxytocic drugs and their use is given. The author describes in detail the therapeutic activity of ergot, pituitary extract, quinine, doryl, œstrogens, calcium, and some newer less known drugs as gravitol, hydrastin, and harmalol. The direct action whether through muscle stimulation or through nerve impulses is discussed intelligently. The danger from long use of ergot is emphasized. The combination of œstrogens and oxytocics is discussed. This is a good general review of the subject. P. J. KEARNS

Meigs' Syndrome, Clay, A. C. Johnston, R. N. and Samson, L.: *Brit. M. J.*, 1944, **2**: 113.

Two cases of Meigs' syndrome (fibroma of the ovary with pleural effusion and ascites) are described. This condition is probably rare, but without doubt some cases go unrecognized, since they are very often ill and simulate advanced carcinoma of the ovary or severe cardiac, renal, pulmonary or hepatic disease. This is most unfortunate, since such patients would be denied an operation which gives excellent results.

The syndrome must always be considered in a differential diagnosis of abdominal and chest effusions, and as only one other case has been described in the British literature in the last 20 years the authors feel that the occurrence of two cases within a year among a relatively small population suggests that some cases are being overlooked. ROSS MITCHELL

Rupture in a Supposed Lower Segment Cæsarean Section Scar. James, D. W.: *Brit. M. J.*, 1944, **2**: 112.

Certain conclusions may be drawn from this case with regard to previous Cæsarean operations in general: (1) that full notes of a previous Cæsarean section should always be obtained if possible; (2) that the abdominal scar is not necessarily a true indication of the nature of the uterine scar; (3) that great vigilance is necessary in all cases previously delivered by Cæsarean section and subsequently allowed a natural labour, which must take place in a hospital; (4) that definite signs of overstretching of the scar usually precede the actual rupture and that rupture may occur with only weak contractions; (5) that the prognosis depends upon the time elapsing between rupture and laparotomy.

Early diagnosis of impending rupture should reduce the mortality to a minimum. In the case reported only a few minutes elapsed between rupture and the delivery of the child. A little earlier and the uterus might have been saved; a little later and two lives might have been lost. ROSS MITCHELL

Pædiatrics

Malnutrition and Mental Deficiency. Wilder, J.: *The Nervous Child*, 1944, **3**: 174.

This is a review of the recent findings regarding the relationship between nutrition and mental development and an attempt to indicate the importance of nutrition for mental and physical functioning. Faulty or insufficient nutrition in children may result in a retardation in the development of the brain with consequent arrest or alteration in mental function. Special emphasis is placed on the significance of temporary or permanent increased demand for sugar in children who appear to have no definite organic disease. Starvation or deprivation of carbohydrates renders the child hypoglycæmic more easily than it does an adult. No definite information exists as yet regarding the influence of repeated hypoglycæmia in childhood on the development of the brain, but certain symptoms such as somnambulism, enuresis or pavor nocturnus have been linked to hypoglycæmia. Lack of proteins is said to lead to lassitude, physical and mental fatigue and depression. While little is known about protein metabolism of the brain it is noted that there is the interesting condition of phenylpyruvic oligophrenia which is a state of feeblemindedness associated with some neurological signs such as spasticity of the extrapyramidal type, increased reflexes and various hyperkinesias. After reviewing the influence of fats, minerals and vitamins on the development of the nervous system the author concludes with the statement that by developing and making full use of the science of nutrition it will be possible to decrease to some extent the number of mental deficients.

BARUCH SILVERMAN

Food and Emotional Security. Bruch, H.: *The Nervous Child*, 1944, **3**: 165.

The author who has made extensive studies of the development of eating habits in children states that most important for the development of food habits is the attitude of the mother toward the feeding situation and her relationship to the child. If the emotional relationship is healthy and sound the child will develop habits similar to those of the parent. Under ordinary circumstances the individual's appetite seems well able to regulate his food intake so that he can develop normally and keep his weight stable. The self-regulation may be disturbed in certain rare neurological disorders such as encephalitis and mid-brain lesions. Emotional factors are a more frequent source of interference with self-regulation of diet. If a mother is neurotic, overprotective or has some other unwholesome attitude toward her child the giving of food to the child becomes charged with emotional implications to an unhealthy degree. This is the setting in which feeding difficulties develop. While refusal to eat is a very common complaint in pædiatric practice severe degrees of malnutrition are, however, not frequently encountered during childhood. In fact the author states that a tendency to overeating so that a conspicuous obesity develops seems more frequent although a less common complaint. In some cases food seems to be the only source of satisfaction and the longing for it becomes an uncontrolled craving. An insecure and unloved child may seek relief from his feelings of anxiety and helplessness by eating excessively. Several cases are reported to illustrate this relationship between food and emotional security. BARUCH SILVERMAN

Otolaryngology

Sulfa Drugs in Mastoidectomy Wound. Herzig, A. J.: *The Laryngoscope*, 1944, **54**: 199.

The author quotes the partisans of the complete closure after mastoidectomy, from Blake (1906) to Coates (1920). After Levingston's report in 1941, the use of sulfanilamide and sulfathiazole powder poured into the mastoid cavity has become more and more popular.

The author describes his method as follows: Complete exenteration, no debris left; no chemical or saline solution in flushing of the wound, which is simply dried; equal parts of sulfanilamide and sulfathiazole powder are packed into the mastoid cavity, including the antrum. The skin is then closed with silkworm gut sutures or Michel clips which are left for 5 days; after their removal, no further dressings are needed.

Among the 7 cases reported, the youngest case was 5 months and the oldest 49 years; all of them were seen at the acute or sub-acute stage; in each one, positive hæmolytic streptococcus culture was present. The postoperative hospitalization time varied from 3 to 17 days. Here are the author's conclusions: rapidity of cure, lessening of hospitalization, little or no annoyance to the patient, no postaural depression or deformity, no further dressing (very much appreciated by children), early return of adult to work. V. LATRAVERSE

Injury to the Ears Among Battle Casualties of the Western Desert. Collins, E. G.: *J. Laryngol. & Otol.*, 1944, **59**: 1.

Among 885 battle casualties of all sorts, one out of every five sustained some aural trauma. This trauma was usually due to blast. The blast consists of a sharply rising positive atmospheric pressure with a gradually diminishing negative phase. The inner ear damage occurs before the rupture of the tympanum. The rupture of the drum is unimportant except for the fact that middle ear infection frequently develops. A mixed type of deafness results with the usual signs. In some cases there is a psychological element present but up to the present differentiation is difficult. There is also in some cases an associated damage to the vestibular labyrinth which can be detected by caloric tests. Prophylaxis by using cotton wool plugs and avoiding syringing of wax from ears has been helpful. Treatment is by dry dressing with sulfonamide powder for external canal injuries, by cleaning and a sterile plug of cotton wool for perforations and for infected cases the usual alcohol, carbolic acid and boric acid drops after cleaning. The patients should be warned to avoid nose blowing, swimming and getting water in the ear when bathing. Concussion deafness responds to rest but tinnitus is troublesome and usually requires sedatives.

GUY H. FISK

Roentgenology

Determination of the Placental Site in Bleeding During the Last Trimester of Pregnancy. McCort, J. J., Davidson, C. N. and Walton, H. J.: *Am. J. Roentgenol.*, 1944, **52**: 128.

A group of 132 patients with the presenting symptom of bleeding during the last trimester of pregnancy was examined in the department of radiology for the presence of placenta prævia. A soft tissue roentgenographical study of the abdomen is first made. If, after careful study, the main portion of the placenta is found to lie in the fundus, it is reported as negative for placenta prævia and no further examination is made. If the placenta is not visualized in this position, an air cystogram is done to determine if there is any tissue intervening between the fetal head and the bladder wall.

The following signs are of value in positive diagnosis of placenta prævia: (*a*) failure to visualize the placenta in the body of the uterus suggests central placenta prævia; (*b*) location of mass of placenta below the equator of the uterus; (*c*) widening of sacral promontory-fetal head distance when the placenta is implanted upon the anterior wall; (*d*) widening of symphysis pubis-fetal head distance when the placenta is implanted upon the anterior wall; (*e*) widening of the vesicocephalic distance seen after pneumocystography; (*f*) lateral displacement of the bladder seen after pneumocystography; (*f*) displacement of the fetal head from the mid-coronal and sagittal planes.

R. C. BURR

The Ureter and its Involvement in Pelvic Irradiation. Mansur, E. E.: *Radiology*, 1944, **43**: 147.

Ureteral obstruction must be assumed as a definite hazard in the treatment of cervical cancer by radium and x-rays. Literature on this subject and the personal observations of the writer would indicate that this is a frequent aftermath of heavy irradiation of the cervix.

One warning should be repeated, as it is of the utmost importance in this work. *Do not wait for symptoms of ureteral block to appear before doing something to prevent the same.* It is comparatively easy to keep the ureters open but quite another problem to open them up after stricture is established. The ureter is a delicate structure, and the trauma from very small catheters, when these are all that will pass, is vastly greater than the trauma when a fairly large whistle-tipped catheter can be inserted. The early primary cystoscopic catheterization is important. It is believed that the catheters should be left in a few hours even when the ureters are found to be normal in size, to help straighten them out. This makes subsequent catheterization easier, when mild degrees of contracture in the ureters, rather than their natural curves, may have to be overcome.

Cystoscopy and repeated ureteral catheterization call for fortitude on the part of the patient, as well as cooperation. It has been found, however, that patients will co-operate when the importance of this measure is explained to them. R. C. BURR

Anæsthesia

The Influence of Ether, Morphine and Nembutal on Mortality in Experimental Burns. Elman, R.: *Ann. Surg.*, 1944, **120**: 211.

This is a report of experiments which show that the early mortality following severe thermal injury is profoundly influenced by the type of sedation and anæsthesia used. Dogs were anæsthetized with nembutal, nembutal and morphine, morphine and ether, and ether alone. Following this, the various animals were subjected to a severe burn stimulus. The 24 hour mortality was as follows: nembutal plus morphine (6 to 10 mgm. per kilogram body weight) combination 100%; morphine and ether (morphine 6 to 10 mgm. per kilo) 80%; nembutal alone 50%; morphine (3 mgm. per kilo) plus ether, 20%; and finally ether alone, 10%.

Hæmoconcentration curves were obtained in all these experiments. Those with ether and without morphine showed a higher peak. It was concluded that morphine had little influence on the hæmoconcentration in burns; if anything it tends to decrease it probably due to a toxic effect upon the respiration. From the experiments it is evident that ether alone gives the best mortality results, but is increased to 80% when morphine is used with it in doses of 6 to 10 mgm. per kilogram. The deleterious effect of nembutal with morphine was shown by the fact that a 100% mortality followed this combination. The 50% mortality of nembutal alone must be qualified as the dose was not large enough to produce adequate depth of anæsthesia and protection from afferent impulses to the cerebrum. One thing is obvious from the experiments, that morphine increases the mortality in experimental burns and its present widespread use in the treatment of burns should be considerably limited to cases where actual extreme pain is present, *i.e.*, at the time of injury. Later on pain often becomes completely absent and the sensorium is frequently dulled in severe cases. Under such conditions large doses of

morphine should certainly not be used, inasmuch as it may lead to harmful effects, perhaps even increasing the mortality in spite of the use of other beneficial therapy. F. ARTHUR H. WILKINSON

Therapeutics

Penicillin in the Treatment of Meningitis. Rosenberg, D. H. and Arling, P. A.: *J. Am. M. Ass.*, 1944, **125:** 1011.

Penicillin was administered intrathecally and intravenously or intramuscularly to 65 patients with cerebrospinal fever; 11 with bacteræmia, 3 with hæmolytic streptococcus meningitis; 2 with streptococcus viridans bacteræmia and meningitis; and one patient with pneumococcal meningitis secondary to otitis media. Seventy of the 71 patients recovered. Except for slight unilateral paresis of the sixth cranial nerve in one patient, no sequelæ were observed.

Although one intrathecal injection of 10,000 units controlled some of the milder or earlier infections, a minimum of two injections is advocated as a precautionary measure. In the severe infections, as much as 5 intrathecal injections (50,000 units) were required. Bacteræmia was controlled by 40,000 to 130,000 units of penicillin intravenously and intramuscularly in the majority of instances. In a patient with a fulminating meningococcæmia and Waterhouse-Friderischsen syndrome 250,000 units over a period of 48 hours was followed by recovery. In meningitis secondary to otitis media more prolonged intravenous or intramuscular therapy is indicated. Intravenous and intramuscular penicillin is ineffective in the treatment of such complications of meningococcæmia as acute arthritis, epididymitis, orchitis or pericarditis.

The authors state finally that penicillin administered both intrathecally and intravenously or intramuscularly is an effective highly potent agent in the treatment of meningitis. No significant untoward effects were demonstrable. S. R. TOWNSEND

The Treatment of Attacks of Sinus Tachycardia with Prostigmin. Waldman, S. and Moskowitz, S. N.: *Ann. Int. Med.*, 1944, **20:** 793.

The authors point out that sinus tachycardia may be physiological in origin, may accompany organic conditions, or may have no apparent etiological basis. In cases of the latter type of attack, the symptoms, distressing to the patient, may be readily aborted by the intramuscular administration of 2 c.c. (1 mgm.) prostigmin methylsulphate, a cholinergic drug. The prophylactic oral use of prostigmin bromide tablets has proved effective in attacks of sinus tachycardia in such cases in which these attacks occur at frequent intervals. Four tablets of 15 mgm. each, taken at equally spaced intervals is the required daily dose.

The rationale of therapy is briefly reviewed.
S. R. TOWNSEND

Pathology and Experimental Medicine

Secondary Carcinoma of the Œsophagus as a Cause of Dysphagia. Toreson, W. E.: *Arch. Path.*, 1944, **38:** 82.

Among 599 consecutive cases of cancer, secondary involvement of the œsophagus was found in 19 or 3.2%. These, together with 7 additional cases, made a total of 26 cases of secondary cancer of the œsophagus available for study. The tumours were carcinomas in 24 cases, lymphosarcoma in one and cancer of undetermined origin and type in one. The primary sites were: trachea or bronchus, 8 cases; stomach, 7; larynx, 4; breast, 2; pancreas, 2; testis, 1; mediastinal node, 1; and one of undetermined source. In 8 cases (30%) the involvement was metastatic from a distant source, rather than by direct extension.

Twelve of the 26 cases presented clinical symptoms of partial or complete obstruction of the œsophagus, in 9 the result of direct extension, and in 3 due to metastases from a distant primary growth. Three patients showed dysphagia due to direct extension from a primary carcinoma of the bronchus; they also suffered from syphilitic aortitis and diffuse dilatation of the thoracic aorta, the latter having been thought clinically to be the cause of the dysphagia. This suggests that when moderately severe dysphagia accompanies diffuse dilatation of the aorta, the possibility of obstruction by secondary tumour should be kept in mind.

Contrary to previous reports that secondary carcinoma of the œsophagus with dysphagia is a rare event, it was concluded that secondary involvement of the œsophagus is not rare and in about half the cases, leads to symptoms of obstruction. M. A. GOLD

Hygiene and Public Health

Measures to Prevent and Control an Epidemic of Ringworm of the Scalp. Lewis, G. M., Silvers, S. H., Cipollaro, A. C., Muskatblit, E. and Mitchell, H. N.: *N.Y. State J. Med.*, 1944, **44:** 1327.

The authors state that tinea capitis (Microsporon audouini) has become epidemic in New York City in recent years. No over all figures of incidence are given, but in one school where the incidence was high there were 112 cases of ringworm among 900 children. Because of the difficulty of cure and the uselessness of most methods of treatment, the authors believe that all cases should be treated by x-ray and that all treatment should be under the guidance of a skilled dermatologist. Methods for the control of the disease in New York City are recommended as follows:

1. Case finding: (*a*) The disease should be notifiable. (*b*) Examination of all school children and as many as possible of pre-school children should be made. To do this effectively filtered ultra-violet light (Wood light) is necessary. The examination should be repeated every three months. (*c*) Facilities for culturing the microsporon should be available.

2. Treatment: (*a*) A district diagnostic centre should be set up to assist in the diagnosis, arrange for treatment, and certify cure. (*b*) The department of health should register all properly equipped and staffed centres for treatment. (*c*) Facilities and personnel for follow-up of treatment should be provided by the department of health.

3. Prevention: (*a*) Institutions caring for children should be inspected for cases of ring worm. (*b*) Barber shops should be advised of the situation and should be prohibited from cutting the hair of infected persons. (*c*) There should be a plan of public information through the usual channels of publicity.
FRANK G. PEDLEY

Industrial Medicine

Medical Service in Industry in the United States. Johnson, O. J.: *Brit. J. Indust. Med.*, 1944, **1:** 62.

The author discusses medical service in American industry at the present time. Engaged in the production of war materials are (1) Government owned and operated ordnance plants under the direction of the Army and Navy; (2) Government owned but privately operated plants; and, (3) privately owned and operated plants converted to war material production. The first two require little attention in health problems from outside agencies. Of the privately owned plants, the large ones already have a medical service but of the small plants employing 1,000 workers or less, which represent a large majority of all industries in the United States, few have an adequate medical program.

Medical service in American industry is stimulated by legislation, by governmental and private agencies, and by the medical profession. The agencies interested differ as to their form of participation but the objective com-

mon to all is the prevention of lost time in industry from sickness and accidents. Some of the governmental agencies offer no technical assistance but are active in promoting medical programs with the use of the technical services of the local bureaux of industrial hygiene. The Division of Industrial Hygiene of the U.S. Public Health Service provides services of a consulting nature; their recommendations are made to industrial management.

The American Medical Association participates through its Council on Industrial Health, which cooperates with committees on industrial health of the state medical societies. They hold that the industrial medical service can aid in health education and physical supervision of employees in the plant, referring the employee to a physician of his choice for any necessary remedial care.

The author shows how small industries are meeting their medical needs, the arrangements with doctors, nurses, the use of pre-placement examinations, etc. Reference is made to other phases of industrial health such as: nurses in industry, nutrition, women in industry, ancillary services, procurement and training of physicians, and the distribution of physicians.

MARGARET H. WILTON

Occupational Contact Dermatitis Among Aircraft Workers. Hall, A. F.: *J. Am. M. Ass.*, 1944, **125:** 179.

That "dural poisoning", "aluminum poisoning" and "metal poisoning" are tending to be haphazard diagnoses, and that zinc chromate primer accounts for the great majority of cases of occupational contact dermatitis in the aircraft industry, are facts established by a study conducted at the Santa Monica and El Segundo plants of the Douglas Aircraft Company, California.

The clinical material on which the present report is based consisted of 755 employees who were referred to the "skin clinic" during a 7 months' period. A diagnosis was definitely established in 580 cases. Approximately one-third were found to be non-occupational in origin. For statistical analysis 202 cases of contact dermatitis of industrial origin were selected in an endeavour to determine the contact substances most commonly at fault.

Five per cent of the cases studied were found to be due to dural and only 2% to aluminum. Zinc chromate primer accounted for the great majority of cases (65%). Of these, 68% were due to the zinc chromate in the primer; 17% to one or more of the resin ingredients and 15% were due to both. In the production of 47 cases of identified occupational contact there were 25 causative factors. Nine cases were due to soap.

No evidence of "acquired immunity", "increased tolerance" or "hardening" to contact with any of the substances, was noted. Sensitivity develops after a comparatively long period of exposure. Therefore, preemployment patch tests would be worthless.

There was no evidence that dermatitis due to contact with these substances will not heal spontaneously within reasonable time after contact is terminated. Treatment should be limited to local applications that will not irritate and prolong the dermatitis. No evidence of systemic involvement due to contact with or inhalation of the mentioned substances was observed.

MARGARET H. WILTON

Those that ever intend to govern their children should begin it whilst they are very little, and look that they perfectly comply with the will of their parents.—John Locke.

Obituaries

Henry Havelock Chown, L.R.C.P., M.R.C.S., Professor Emeritus of Surgery and former Dean of Manitoba Medical College, died at his home in Winnipeg, October 12, at the age of 85. Born at Kingston, Ontario, he was educated in Victoria College and Queen's University. He began practice in Winnipeg in 1880, then did postgraduate work in London and returned to Winnipeg in 1883. From 1883 to 1918 he was connected with Manitoba Medical College first as a teacher of Anatomy, then of Surgery and lastly as Dean from 1901 to 1917, retiring as Professor Emeritus of Surgery. It was largely under his wise guidance that the college became in 1917 the Faculty of Medicine of the University of Manitoba. He was a member of the first Board of Governors of the University.

For 32 years he served on the honorary attending staff of the Winnipeg General Hospital. On retiring from active practice he became medical referee of the Great West Life Assurance Company and held that position until his death. In his later life he travelled extensively, preferably by air, in China, Japan, Egypt, India, New Zealand, Australia, South Africa, Bermuda and California.

In 1903 Queen's University, Kingston, granted him an honorary doctorate of laws. He took an active interest in the Canadian Medical Association and was president in 1901.

It would be difficult to exaggerate the contribution made by Dr. Chown to the cause of medical education in the Canadian west.

Dr. Albert Crux passed away suddenly in Edmonton on September 26, at the age of 72 years. Brought up in Ontario, he graduated in arts and medicine at Toronto University in 1909; having married two years previously Miss Laura Wigle, a returned missionary from Japan. Though handicapped by the effects of infantile paralysis in his youth, he was a hard worker and spent a busy day in practice the day of his death. Besides his widow, he leaves one son and one daughter. The son, Dr. Norman Crux, with the R.C.A.M.C. is at Camp Borden, Ontario.

Dr. Robert Elder, of Vancouver, died recently. He was a nephew of the late R. M. Elder, of Montreal. Dr. Elder graduated from McGill University in 1903.

Dr. George Hamilton Gardiner, aged 64, coroner since 1939 and former alderman and member of the Board of Education, died on October 29 at the Western Hospital, Toronto. He was stricken two days previously with coronary thrombosis.

A medical practitioner in Toronto for 30 years, he had lived the greater part of the time on Annette St., where he had an office. Dr. Gardiner was on the active staff of Western Hospital and the associate staff of St. Joseph's Hospital.

A graduate of Ottawa Normal School, he taught school for a few years. After graduating in medicine from the University of Toronto in 1906, he practised for a time as a railroad doctor in Northern Ontario and later in Eldorado, near Madoc. He came to Toronto in 1914.

Appointed in November, 1931, as the Toronto Board of Education representative of Ward Seven he was elected trustee the following year. Elected to the City Council in 1934, he served five terms as alderman.

Dr. Gardiner was prominent in Y.M.C.A. work and a past president of the West Toronto Branch. He was an elder in High Park United Church and a former member of the Kiwanis Club.

Surviving are his widow, Edna M. McDonald Gardiner; a son, Percival McDonald Gardiner, Toronto; two brothers, Percy Gardiner, Toronto, and Bob Gardiner, Mount Forest, and a sister, Miss Sophie Gardiner, Mount Forest.

Dr. Walter Allen Hall, of Walkerton, Ont., died in the Bruce County Hospital on August 3. He was prominent in the affairs of this district and physician of the Bruce County House of Refuge and Jail Surgeon of the County for the past two decades. He was 77 years old.

Dr. Hall was born near Mitchell, Ont., where he received his high school education. He graduated in medicine from Queen's University in 1900. Before taking up medicine he taught school for several years. He married Miss Bartleman who survives him with no family. An only daughter, Isla, died in 1911 at the early age of seven years.

In 1928 Dr. Hall suffered a badly cut artery in the right wrist in a motor accident in which his right arm and wrist became incapacitated for further surgery.

Dr. Hall sustained another serious accident a few years later near Dundalk when his car skidded on new gravel and overturned. He sustained a broken vertebra. From this accident he never fully recovered and it contributed in a more or less degree to his general physical decline, which with a seizure of coronary thrombosis finally terminated a most exemplary, industrious and useful career.

Although he came of a family of five sons and five daughters, one brother, Rev. John Hall, alone survives.

Dr. Charles Watson Hurlburt, of Edmonton, while on a visit to Victoria, B.C., on account of his health, passed away suddenly, on October 25, in his 63rd year. He was born in Mitchell, Ontario, in 1881, and graduated in medicine in 1910 at Toronto University. After his internship, he decided to answer the call of the West, and went to the Province of Saskatchewan, south of Regina, but decided after a short stay in Amulet to move to Alberta, and in 1911, he opened an office in Coronation. He was in the first Great War, and was Superintendent at one time of the Perkins Bull Hospital in London, England. While overseas, he decided to do postgraduate work on the heart, in London, and when he returned to Canada in 1919, specialized in internal medicine. He was for years Pensions' Medical Commissioner in northern Alberta, and was cardiologist at the University of Alberta. He leaves a widow, one daughter, and two sons, both of whom are in the services.

Dr. A. A. King whose death occurred on September 25, at the Seaforth, Ont., home of his niece, Mrs. John Nottingham, had practised in Delta for 42 years. He had ministered to three generations of many families in this district.

Dr. Angus McD. Morton, one of Nova Scotia's best known and beloved physicians, died at Halifax on October 26. Born in Middlefield, Queen's County, Nova Scotia, November 14, 1871, his youth was spent at Grafton, King's County. After graduating from Berwick high school he taught school for a time in the Annapolis Valley, but, feeling the urge for further study, entered the Halifax Medical College from which he graduated in 1898. A year later he began to practise in Bedford and as an associated necessity ran a drugstore. He soon had a very large practice, much of it in the surrounding rural districts. In 1916 he moved to Halifax where he remained actively engaged in general practice until a few weeks before his death. While at Bedford he represented that district in the Halifax County Council and from 1928 to 1933 was a Halifax representative of the Conservative Party in the Nova Scotia Legislature. During Great War I he was Medical Officer of the Canadian Garrison Artillery. At the time of his death he was County Health Officer.

It has been given to few men to possess a capacity for friendship equal to Dr. Morton. For many years each summer brought old classmates and companions to his hospitable home and these gatherings more than anything else kept alive the memory of the Halifax Medical College and the great contribution it made to Canadian Medicine. Genuinely loved and respected, he leaves behind in the hearts of his confrères a deep sense of their loss.

Dr. J. B. Swinden, of Ucluelet, B.C., whose death is reported graduated from a Scottish University in 1901.

Dr. John Tait, one of McGill University's most brilliant professors and research workers, died on October 21 at his home, in his 67th year following a lengthy illness.

Dr. Tait came to McGill University in 1919 as the Joseph Morley Drake professor of physiology and chairman of the department. He was retired in 1940 on account of ill-health and went to his native Scotland for a time before returning to his home here. He was named emeritus professor of physiology at the university in June, 1943, in recognition of the important part which he played in the development of physiological teaching and research at the university.

A native of the Orkney Islands, Dr. Tait was the gold medallist in medicine at Edinburgh in 1906 when he gained his M.D. degree. A year later he obtained the highest scientific degree, Doctor of Science.

He was named assistant in physiology at Edinburgh in 1905 and was promoted to the status of lecturer in experimental physiology in 1910. During these years he also studied at some of the famous European medical research centres, including Goettingen and Berlin.

His work at McGill brought him international recognition. He was the author of many scientific papers and held membership and office in famous scientific societies. He was awarded the gold medal in therapeutics at Edinburgh. He gained the Neill gold medal and prize of the Royal Society, London.

Dr. Tait was a member of the Physiological Society of Great Britain and Ireland, and of the American Physiological Society, and a Fellow of the Royal Society, London. He had the distinction of being made a life member of the British Association for the Advancement of Science, an honour accorded to few.

He was made a member of the International Collegium, worldwide body for the promotion of scientific learning and advancement. His research included work on the nerves, the heart, blood cells, blood coagulation, zoology of shellfish, spleen, and the mechanism of the human voice.

His work here included a distinct contribution to clinical medicine, notably in knowledge and practice concerning the working of the inner ear and equilibrium. He was also known widely for his studies on blood and other physiological branches of study.

During the Great War he served with a general hospital unit as a lieutenant in the Royal Army Medical Corps and also with the 9th Casualty Clearing Station with the rank of captain.

He is survived by his widow, three daughters, Mrs. C. J. Malley, of Montreal, and Mrs. E. F. Ryan, and Mrs. E. H. Hickey, both of Washington, D.C., and one son, Eric, of Montreal.

Dr. Morris W. Thomas. We learn with the deepest regret that Dr. Thomas, the well-known executive secretary of the British Columbia Division, was accidentally drowned on a fishing trip on November 11 at Vancouver Island. A full obituary notice will appear in our next issue.

A wine company at St. Catharines, Ont., has been converted to making apple syrup from windfalls and culls; the sugar content of the product has been 60% and it is being prepared as a table syrup or for use in cigarettes.

News Items

Alberta

Until a year ago, the Province of Alberta had two hospitals' associations, and used to have their annual meetings separately, but this year they agreed to have a joint meeting which was held in Calgary in the first week in November. It is hoped by this means to strengthen the associations and increase their co-operation.

Owing to being shorthanded, some of the health units have adopted a plan of having the school children keep records of their own weights, in the various schools. This is done in co-operation with the teachers and has given an increased interest on the part of the pupils.

It has been difficult to get mine doctors in recent months. Many men prefer to go to cities and wait while they build up a practice, rather than go to a mine where the union officers have a tendency to dictate when and how the physician does his work. If the physician objects to this dictation, it means severance of the contract and a fresh start for the physician elsewhere.

Owing to the fact that at a recent meeting of the Legislature, the Workmen's Compensation Board Act was amended, putting on industry the full burden of medical aid, there has been a tendency for the mine owners to minimize their financial burdens by getting the doctors to do the Compensation Board's work at a reduced rate. Some companies are offering less than two cents per shift, and then only pay for the shifts the men work. Other mine owners pay 50 cents per month, which amount is also inadequate to meet the work and expense involved by the doctor. While the Board is no party to this arrangement, and is quite willing to have the mine doctors render their accounts in a similar manner to all other physicians, yet, if that is done the tendency is to put in nurses and have the dressings attended to by them, and only report the cases when something develops in the patient.

The Hon. W. W. Cross, Minister of Health, at the Hospitals' Convention in Calgary stated that he was looking forward to all of the hospitals being municipalized, which meant that they would be largely supported by the taxes of the people and the general ward rate fixed at one dollar per day. On a former occasion, he is reported to have stated that the present rural municipal hospitals could balance their budgets on the present tax basis if the per diem allowance granted by the Government were raised from 45 cents to $1.00 and the patients would get general ward services without pay.

Dr. A. Somerville, Hospitals' Inspector, outlined the workings of the maternity hospitalization plan, which provided twelve days' free hospitalization, general ward services, for maternity cases. He stated they had established point services record, so that the hospitals better equipped would receive greater remuneration than others with a view to encouraging the general improvement in such services.

While the plan is based on general ward services, patients may have private or semi-private wards by paying the difference between these rates and general ward ones.

According to the Hon. W. W. Cross, Minister of Health, work on the sanatorium for tuberculous patients which was to have been erected on the University of Alberta grounds, may not be started until next spring, owing to shortage of manpower and of material. The estimated cost of this building is five hundred thousand dollars.

The Stoney Indian Hospital, at Morley, west of Calgary, was closed several weeks ago due to a shortage of nurses. The condition has now been remedied and the hospital has re-opened its doors.

Dr. Graham Huckell, orthopædic surgeon of the University of Alberta, has arrived home in Edmonton, having spent the past six months as chief surgeon of the Canadian Red Cross Hospital in Scotland.

Sixty-nine cases of infantile paralysis have occurred in this province since mid summer with one death. They have been of a mild type with complete recovery in most instances. G. E. LEARMONTH

British Columbia

The Bulletin of the Vancouver Medical Association attains its majority with the October, 1944, issue, and will publish a special anniversary number in celebration of the event.

The Library of the Vancouver Medical Association has installed a microfilm service for the benefit of its members, and microfilms of almost any articles in the files of the Army Medical Library at Washington, as well as from many other sources, are obtainable. A desk projector goes with the service and already a fairly comprehensive library has been established.

Lieut.-Col. R. H. Mustard and Lieut.-Col. G. H. Clement have both returned to civil life and have resumed their practices in Vancouver, the former as a specialist in eye, ear, nose and throat work.

J. H. MACDERMOT

Manitoba

Headed by Dr. P. H. T. Thorlakson a medical deputation consisting of Dean A. T. Mathers, Dr. H. Coppinger, Superintendent of Winnipeg General Hospital, Dr. G. Williams, Superintendent Children's Hospital and Dr. Bruce Chown appeared before the Winnipeg City Council to present the scheme of a medical centre about the Manitoba Medical College and the Winnipeg General Hospital. It was stated that the Children's Hospital planned to move from its present site to one near the General Hospital. Other buildings which figure in the scheme are a university teaching unit in the Winnipeg General Hospital, a maternity pavilion, a research building and a convalescent hospital of 300 beds. Dr. Thorlakson estimated that the scheme would cost at least $1,250,000. Council gave a sympathetic hearing to the plan.

Lieut.-Col. C. W. Clark and Major Cherry Bleeks recently returned to their homes in Winnipeg after an absence overseas of nearly five years. Col. Clark was warmly welcomed when he appeared at the annual interns-attending staff dinner in the interns' quarters, General Hospital. ROSS MITCHELL

New Brunswick

Lieut.-Col. Jos. Tanzman, O.C. 14th Field Ambulance, R.C.A.M.C., on service overseas has sent home an interesting souvenir to the Reserve 14th Field Ambulance in Saint John, N.B. This is a German Swastika flag which once graced a German Field Hospital. Col. Tanzman reports that on taking over this hospital his command had need of considerable diplomacy as the remaining German wounded soon had French civilians and British and Canadian casualties for company. It is hoped that the close contact of active and reserve units of our forces may be continued in more peaceful times, to retain the legend of successes in arms in many fields in our Canadian units, many of which have already a history to inspire all Canadians.

Dr. E. A. Petrie, Radiologist at Saint Joseph's Hospital, Saint John, has been confined to hospital for a short time suffering from an acute ear infection.

Considering the present difficulties of medical practice, a considerable delegation from New Brunswick attended the Refresher Course at Dalhousie University Medical School in October. These yearly courses continue to gain in popularity.

Dr. A. E. Macaulay, senior surgeon of the Saint John General Hospital is at present in Chicago attending surgical meetings.

A sharp epidemic of typhoid at Edmundston, N.B., comprising nine cases was arrested promptly when Dr. J. P. Richard, District Medical Health Officer traced the source of infection to a certain milk supply.

Dr. Harold Robey, final year student at Dalhousie Medical School is interning at the Victoria Public Hospital, Fredericton.

Dr. A. T. Leatherbarrow of the permanent medical staff of the D.P.N.H. Hospital, West Saint John is at present taking a postgraduate course in physical medicine at the Mayo Clinic and in New York.

Dr. Arnold Branch, Provincial Pathologist, was the special speaker at the October meeting of the Fredericton Medical Society. His subject was "Penicillin". Dr. M. L. Jewett, of Millville, was chairman.

Dr. Ireene Allen MacPherson of the Saint John Tuberculosis Hospital attended the postgraduate course in medicine provided by the American College of Physicians at Chicago.

The monthly meeting of the Saint John Medical Society was addressed by Dr. D. J. Tonning on the subject of "Methyl alcohol poisoning". Attendance was large and discussion attractive and informing.

One usually thinks of a pathologist as a dignified servant immured in his mysterious sanctum in an air of research and olfactory assault but it sometimes happens that field work is part of his duties. Lately in a matter of days Dr. Arnold Branch has made two trips to the north of the Province of New Brunswick and one trip to Prince Edward Island using all methods of transportation except snowshoes. Laboratory workers must be versatile.

Lieut.-Col. "Ted" Coffey, R.C.A.M.C., has returned to Canada on a mission dealing with physical medicine. His many friends across Canada will be glad to see him.

A. STANLEY KIRKLAND

Nova Scotia

The Dalhousie Refresher Course held at Halifax early in October was a decided success. It is true that the attendance was not so large as last year due to fewer medical men in the Services being present. In all 221 physicians and 39 students registered. Of these 89 were in the Services. Last year 209 who registered were from the Services. Of the civilian practitioners attending four were from Prince Edward Island, 7 from New Brunswick and one from Newfoundland.

Clinical lectures and demonstrations were held at the various hospitals and lectures at the Lord Nelson Hotel. The program was varied, comprehensive and designed to illustrate progress in all fields of medicine. A feature of the event was the inspection of the reorganized Anatomy Department at Dalhousie University.

During October the writer had the pleasure of attending the Inter-State Medical Assembly at Chicago. The attendance was very large considering the demands of war. The attendance by older physicians was notable. The program featured diagnosis and was excellent in character. Two particular trends were prominent.

1. The emphasis on rehabilitation of the sick and injured. This, of course, has been greatly stimulated by the care of the wounded and their subsequent return to civilian life. However, there is a decided tendency for this to be extended more widely than before in the care of civilians.

2. The early mobilization of the patient after operation. Long series of cases were given indicating that getting the patient up early after operation resulted in increased comfort and satisfaction to the patient, fewer postoperative complications and an earlier return to normal function than where bed rest was continued twelve days or more.

H. L. SCAMMELL

Ontario

A special meeting of the Academy of Medicine, Toronto, on October 17 was addressed by distinguished visitors. The subject was "Clinical evidence of nutritional deficiencies". W. H. Sebrell, U.S. Public Health Service spoke on "Riboflavin", Norman Joliffe of Bellevue Hospital, New York, on "Niacin", and H. D. Kruse, Associate Director of Milbank Memorial Fund, New York, on "Ascorbic acid". Coloured lantern slides illustrated clinical cases of deficiencies of these vitamins. B. S. Platt, Director of Human Nutritional Research Unit, Medical Research Council, London, Eng., was to have spoken on "Vitamin A and thiamin", but was detained in England.

Russell M. Wilder, Professor of Medicine and Nutrition, University of Minnesota Graduate School, Rochester, Minn., gave a most enlightening address on "The importance of adequate nutrition in the practice of medicine". J. McGrath, President of the Newfoundland Medical Association, St. John's, Nfld., gave an account of a survey of nutrition in his country from the standpoint of Public Health.

The material of these addresses was most skilfully selected and the program lasted only two hours. It was a profitable evening.

The Ottawa Civic Hospital, with its nine hundred beds all filled, is obliged to get along with only eight interns. Smaller hospitals throughout the Province have, proportionately, an equal or greater shortage. The teaching hospitals in Ontario are all shorthanded so far as intern staff is concerned.

The November meeting of the Council of the College of Physicians and Surgeons of Ontario was held in the College Chambers, Toronto, on November 8, 1944. The committee on legislation reported a series of proposed amendments to the Medical Act which will be presented to the Minister of Health. One suggestion was a modification of the section on discipline. As the Act now stands a charge of misconduct against a member of the college must read "infamous and disgraceful conduct in a professional respect" which is rather strong language for use in many cases.

The Discipline Committee was confronted with six practitioners who had pleaded guilty and had been fined for breaches of the Liquor Control Act. There were three classed as having flagrantly abused their privileges of prescribing potable liquors as medicines. A list was shown the committee which indicated that a number of practitioners were confusing therapeutics with seasonal conviviality.

Dr. John Sheahan, of St. Catharines, was elected as representative of the Ontario College of Physicians and Surgeons to the Medical Council of Canada.

M. H. V. CAMERON